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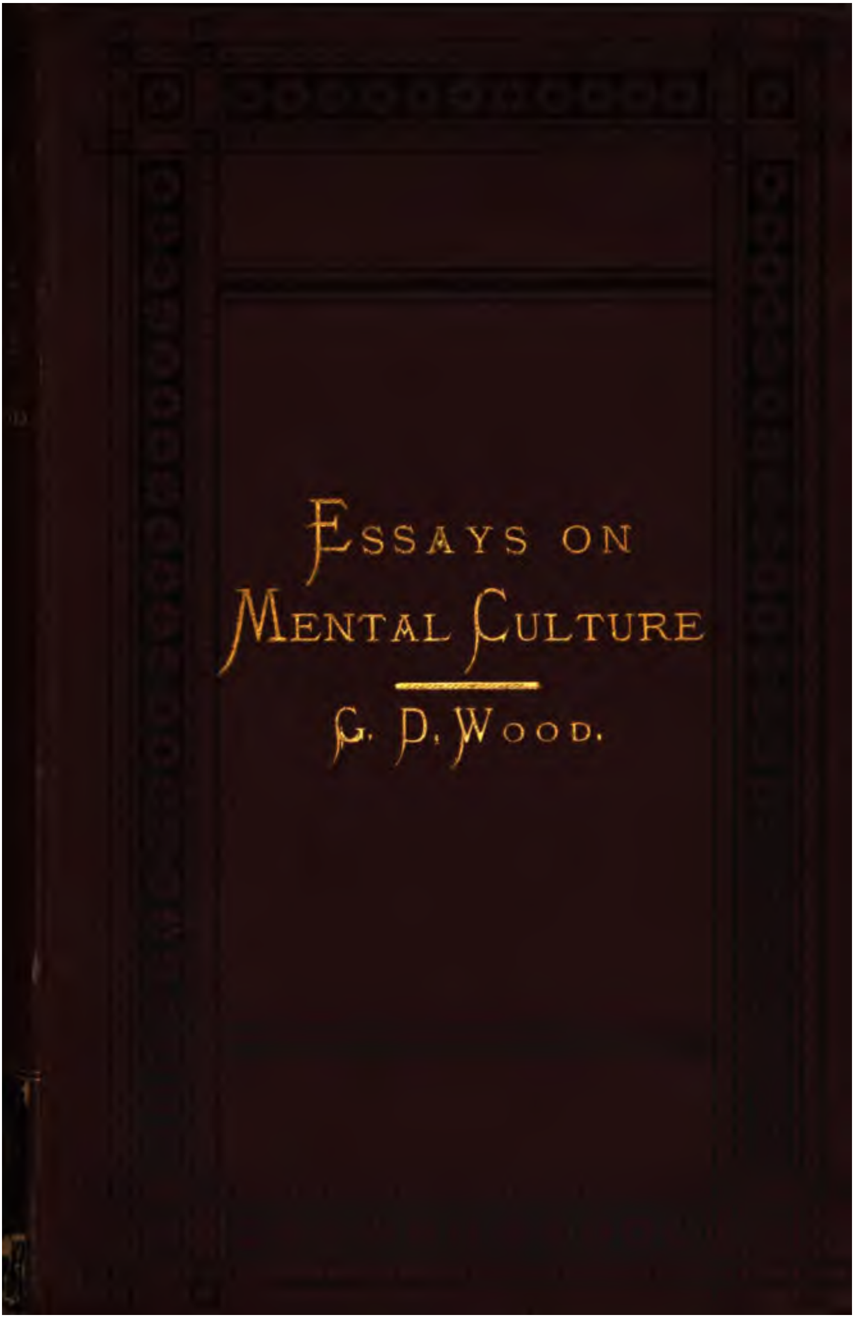

ESSAYS ON MENTAL CULTURE

G. D. WOOD.

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ESSAYS ON MENTAL CULTURE.

W. DAVY AND SON, GILBERT STREET, OXFORD ST., W.

ESSAYS ON MENTAL CULTURE:

A BOOK FOR GIRL STUDENTS.

BY

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"The Study of the Physical Sciences," &c.

"Aide-toi et le Ciel t'aidera."

BIBLIOTHECA BODLEIANA

London:
DULAU & Co., 37, SOHO SQUARE.

1877.

260. g. 35

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PREFACE.

THE object of the following pages may be more readily understood if the reader will consider for a moment how difficult it is to answer the two questions—What ought a girl's education to be? and how is she to secure it? Society has not as yet quite determined what girls should strive for in this direction; and girls themselves are not likely to be the best judges in a matter upon which they bring to bear but immature powers, partial knowledge, and imperfectly formed tastes. Circumstanced like this, should a student ask herself these questions:—What am I working at all these subjects for? In what way can they benefit me? and what ought the education of a woman to be?—her answers must necessarily be unsatisfactory. Now, every experienced educator knows that, after the age of elementary work, girls are often permitted to decide for themselves what direction their studies shall take, and therefore guidance and encouragement on the part of others count for much in cases like these where no professional career stimulates the young worker, and the goal in educational matters is both distant and undetermined. There is danger that students encountering the labour of their education without definite aims, may accept their tasks as incidental to their youthful period of life, take but a languid interest in some branches, and possibly cherish a dislike to others that present a less attractive aspect.

The introduction of University local examinations has no doubt been of service in directing attention to certain subjects, and furnishing a definite object for the ambition of aspiring students; but the author is by no means certain that such examinations are much better than necessary evils. Working with the express object of passing an examination tells badly in several ways. There is first the temptation to neglect all subjects that will not "pay," or gain marks; second, a large amount of "cram," or work in which memory is encouraged at the expense of thoughtfulness; next, there is danger to health in the spasmodic and forcing process of hurried and exciting preparation; and there is, lastly, the almost inevitable reaction in the shape of dislike for studies that have apparently served their purpose, and in which digestion and assimilation have been much less active than mere reception. These evils of course are not inevitable, but they exist unless carefully guarded against.

The author's intention in these pages is to appeal to students themselves. He has no wish to insinuate that students are left without advice. Each teacher no doubt endeavours to encourage the study of those branches he is occupied with; but the student is in danger of being bewildered by the variety of the claims upon her attention, and can scarcely be expected to fairly weigh their relative importance, and draw reasonable conclusions for her guidance. The consequence is, that girls frequently assume that those branches are best that are easiest or most pleasing, an assumption that not infrequently makes itself injuriously felt in the practical work of education.

These circumstances have suggested this attempt on the writer's part, to help students upon the principle of encouraging a lively sense of the importance of their labours; and for this purpose, in addition to general remarks upon the mental powers, the nature and objects of education, and the classification of knowledge, the author treats of the chief branches separately, and endeavours to point out, first, their character as studies; second, their value, positive and relative, in education; and third, such methods in study as may be adopted with advantage for their value in producing sound and permanent results. It should be mentioned that the object of the author is to supplement, not to clash with, the direct work of the school; and that his remarks are intended for students who are sufficiently advanced to be in a position to direct, to a considerable extent, their own labours, and who are beginning to see how much in all such cases as these depends upon themselves.

The author may add that a somewhat long and varied experience in connection with the education of girls has furnished him with a certain amount of practical acquaintance with the educational aspects of the present day, including the peculiar difficulties he has alluded to; and his present attempt to deal with the subject arises from a firm conviction of its importance. He may also be permitted to mention that the following pages represent the substance of a course of lectures he has frequently delivered to large classes of girls; and whilst conscious that this mode of appealing to the student possesses advantages over every other, he is not without some hope that the press may enable him to be useful beyond the range of his personal labours.

Shepherd's Bush, April, 1877.

THE INTELLECTUAL POWERS.

DIFFERENT POWERS OF THE MIND.—THE KNOWING FACULTIES CONSIDERED.—THEIR IMPORTANCE IN THE ACQUISITION OF KNOWLEDGE.—DEFECTIVE REASONING.—DISTINCTION BETWEEN TASTES AND OPINIONS.

EVERY student should possess some knowledge of the mental powers and their use, just as she knows the use of her hands and feet. By this it is not meant that she should endeavour to become a metaphysician, but understand in a practical way something of the faculties she is constantly employing—their distinction, the order of their development, and their relation to education. A good, useful arrangement of the faculties for such a purpose places them in three divisions:—1. *The Knowing Faculties;* 2. *The Feelings;* 3. *The Will.* By the first we understand those most efficient in the acquisition and digestion of knowledge, and he who possesses them in any considerable degree is termed intelligent. The feelings are also called emotions. They represent the varying moods of the mind, and have much less to do with the acquisition of knowledge than the first-named, and need no further notice here. The Will is a kind of sovereign authority that, when strong, guides and controls the other powers in a very considerable degree, and, like other rulers, may sway his sceptre well or ill.

THE KNOWING FACULTIES.

These powers may conveniently be arranged as under:—

1. *Perceptive.*	Observation,
	Contemplation,
	Attention,
	Comparison,
	Abstraction.
2. *Retentive.*	Memory,
	Recollection.
3. *Creative.*	Conception,
	Imagination,
	Creation.
4. *Causative.*	Reason.

Perceptive Powers.—The *perceptive* powers enable us to see thoroughly, as in Observation, where we control the time and manner of regarding things. Mere seeing is not quite the same thing, as it is frequently passive. A person may pass by a house fifty times and see it, and yet be quite unable to describe it. Look at it with a definite purpose, and you observe its characteristics, one observation being worth more than any number of ordinary regards. In mental matters there is the same distinction. We may see a principle in a hazy way, or we may look at it in a deliberate and thoughtful manner. Should we maintain this condition of mind, we then contemplate or turn over the subject. *Comparison* may then be exercised, by which we perceive still more thoroughly, and in some degree take the measure of the things we observe—a very necessary action, for the closest scrutiny of any single object will be insufficient without an adjustment of its place in relation to other objects. *Observation* will furnish us with all the circumstances of any single fact, but *Comparison* will be necessary before we can judge of these circumstances accurately. If we notice our mind at work we shall soon see, indeed, that we are constantly making comparisons as a matter of habit. If we hear that a man is seven feet high, we, by an effect of comparison with the ordinary stature of a human being, perceive the value of the statement. Bring the same kind of action into play, and the student will appreciate the significance of facts less common. This is nothing but common sense, but it is constantly neglected. Lessons in Geography, History, Grammar, and other subjects are nearly useless without due attention to this practice of comparison. If the student learns in Geography that a mountain is ten thousand feet high, in History that the Spartans were aristocratic, in Grammar that the present participle ends in *ing*, he must compare these with similar facts, or the knowledge will be next to useless, and only a parrot-like mode of learning encouraged.

Abstraction is an operation of the highest importance, but not so easily exercised. It leads to generalisation and classification. We first distinguish an object by one or more of its properties. An orange is round and yellow, a cherry round and red. Roundness is common to the two, and observation of many objects enables us in time to think and speak of roundness independently of the objects. In this way, that is by abstracting or taking away, we get general ideas; for if we think of roundness without the associated object, we have taken it away from the particular object, and seized an idea which may belong equally to an orange, a cherry, the sun, the moon, or the world itself. In a similar way, after the exercise of this faculty on simple matters, and arriving at general ideas of forms, colours, numbers, and such like, we may attain a power of grasping such terms as anger, hope, industry, goodness, and a vast number of similar human attributes. Generalisations are arrived at in the same way, and depend on the same principle. "Honesty is the best policy," is an example of generalisation, and a sentiment like thousands of others, arrived at by observation and comparison. One of the most remarkable generalisations is seen in the Newtonian theory of the forces that control the Solar System, asserting that "every particle of matter attracts and is attracted by every other particle with a force in proportion to the mass, and inversely as the square of the distance." Classification also is attributable to abstraction. We observe that quadrupeds have bones, whether elephants or mice; so with birds, reptiles, and fishes, however they may differ in other respects, they agree in the possession of bones. This is a generalisation, and it forms a convenient distinction, by which all these animals can be grouped together and spoken of as vertebrates. In the various branches of knowledge we continually meet with illustrations of classification: in Grammar verbs, in Astronomy planets, in Physics fluids, in Botany ferns, in Music oratorios, furnish classes of terms based on observation, comparison, and abstraction.

Retentive Faculties.—Memory is a power so essentially fundamental that it is a necessary agent in all kinds of mental work. It would be useless to observe, if impressions could not be retained—stored up, as it were, for use. Memory is usually strong in children, coming into play at an earlier time than the power of comparing and judging. This is as it should be, for by the power of memory a large number of facts obtained by observation and from books can be stored up for future use. A child unconsciously gathers up materials of this kind in all directions. It is curious, and constantly asks questions about animals, plants, the sky, and heavenly bodies. At one moment it is a fact in Botany, another in Astronomy, Chymistry, or Mechanics that is treasured up. High or low, valuable or trivial, without system or intention even, facts are roughly seized and thrown into a miscellaneous heap. Unfortunately, and inevitably, these stores must be imperfect not only in classification but in character. Our own simple impressions are not always to be trusted, and may utterly mislead us. We may see a thing partially, or under disadvantageous circumstances, and so store up something worse than useless. This is an universal source of error, for we must have our facts right, before we can hope to get at sound conclusions. We might as well expect to make good bread of arsenic instead of wholesome flour and water. Memory is not responsible for these errors; it is a storekeeper, and garners the true and the false with equal facility. In employing this faculty, the student will find much advantage in system. Like all the knowing powers, it may be almost indefinitely strengthened. We may acquire the habit of retaining what we wish. As our storekeeper, Memory is impressed by earnestness. If our treasures are but carelessly tossed into his hands, he is but a sorry guardian of them, for how is he to know what we desire to retain and what to learn except by some sign to indicate our appreciation of its value? Should we virtually say to this storekeeper of ours, " I particularly wish you to have a special care of so-and-so," we may be pretty sure of his faithfulness. It is easy to see why this is so. No one desires to retain all the thousands of trivial impressions of daily life—to bear in mind all the words he has spoken or heard, the people he has seen, the food he has eaten, and similar details. These are mostly careless impressions that are consequently and happily soon lost, for our storekeeper having but a limited amount of room, must make a selection, and though not entirely submissive to our will, sometimes storing up what we would rather lose, he will, for the most part, do our bidding, only desiring to know what it really is. To make memory efficient, the student should observe closely and deliberately, and try to feel an interest in the matter, for what we like or are curious about, we remember.

We remember better too those things that are taken up in an orderly way, and so regular and systematic work must be practised, and mere learning by heart as a matter of routine, parrot-like and unintelligent, discouraged. Serious injury indeed is done where the memory acts as a drudge, or a kind of dull lifeless slave. Work that should be attractive and pleasant when performed in a mechanical and dreary way weakens the grasp of the memory, and degrades the noblest of studies to the level of the multiplication table. The danger of trusting too much to the memory is greatest in those students who are naturally quick in learning by heart, and should be guarded against as an impediment to the proper discipline and action of the mind as a whole. Young children are often remarkably quick in acquiring verbal knowledge, and soon establish the habit of reducing all mental work to the condition of lessons to be repeated by mere effort of memory. A show of knowledge is thus displayed which is delusive. History and Geography are perhaps the subjects most frequently learnt in this way, but students addicted to the practice of making memory do everything, will see in Astronomy little but names of planets and constellations; in Botany classes, orders and scientific names of plants; in Grammar the nine parts of speech, and so on. No wonder such students find their work deficient in interest, for this must inevitably be the consequence after the novelty of quickly learning and repeating has worn off.

Recollection is the power of recalling or bringing to mind circumstances that are not present at the moment. It may be regarded as memory dependent on association. Memory bears in mind a certain fact, and that fact has others clinging to it. It is well known how very trifling incidents are recalled with facility when associated with anything that has been of a nature to fix our attention. If a person heard an important piece of news at the moment he happened to be stirring a cup of tea, he would probably remember the slight circumstance as long as he could recall the other. It is related of James Watt that he could recollect the exact spot in Glasgow where his great idea came to him of improving Newcomen's steam engine by the addition of a second cylinder. Though this faculty is not so valuable to the student as memory, it is a great advantage to be able to disinter facts that appear to be entirely buried; it enlarges the bounds by supplementing the action of the more ordinary power, and so for retentive purposes the two may be regarded as one.

Creative Faculties.—As soon as we gain an acquaintance with facts we begin to build with them. When a child has seen and tasted an orange, it can conceive and call to mind any number of oranges in a mental sense. In the same way with other objects as fast as we get familiar with them. We can thus make a single fact of great value. He who has seen a negro can conceive a country of negroes. A river, a castle, a steam-engine, will in a similar way afford a power of conceiving other rivers, castles, and steam-engines. We can easily understand from this how valuable even a solitary example may be. A single painting of a great master, a poem, and many other objects may thus be instrumental in increasing the number of our ideas. Without these primary experiences we are necessarily at fault. An inhabitant of a torrid region, for instance, must find a difficulty in understanding such an amusement as snowballing, because he never sees snow, and reading about it would only imperfectly convey an impression of such a thing. Primary experiences give us the power of forming conceptions. We may change the circumstances of some fact by extending them or contracting them—by an alteration of time and place—and thus conceive something that actually exists, though beyond our personal observation—or even create that which never existed. This is the origin of mechanical inventions on the one hand and poetic creations on the other. Steam-engines and Hamlets are creations. The power of combining the known to produce the previously unknown may be employed by one man to make a sewing machine, by another to produce a Westminster Abbey. It will help us in the useful or the beautiful, common arts and fine arts. It multiplies our conveniences and poetizes our lives. Nothing is too homely, nothing is too grand. Railways, clocks, books, telescopes, pins and needles, systems of government, cannon:—the useful, the destructive, the pleasing, the terrible, the simple, the complex, are examples of this wonderful faculty. In this is man truly great. By this power he transforms the rude matter of the earth into objects of use and beauty; he makes wind, water, and fire work for him; he sends his messages by lightning, and makes the sun himself an artist.

Causative Faculties.—The most important of man's faculties is Reason. Without the power of drawing conclusions no principles could be established, experience would be useless, and intelligent self-guidance impossible. The reasoning may be a simple conclusion or inference from a few facts, or the establishment of grand generalizations by Newtons and Faradays. Reason may dictate the simple action of the moment, whether we shall walk, ride, carry an umbrella, and such like; or whether we shall believe that the earth rolls yearly round the sun. We may be content in some cases to accept the conclusions of others when we cannot examine for ourselves, but the rule should be to exercise an independent judgment under all possible circumstances. A student will find abundant opportunities in her daily exercises for using her judgment, and should avoid the danger of taking things for granted. *Why?* should be the constant thought whenever principles are laid down for acceptance. It would be well to practise easy operations in reasoning, and be careful to get a real *Because* to a

Why. In a vast number of cases we have adopted a compendious mode of answering questions of a commonplace sort, where the real reason is understood, and some statement does duty for it. Let us look at such questions and answers as the following:—

Why don't you go for a walk?

Because it rains.

Why don't you sit here?

Because there is a draught.

Why are you late?

Because I missed the train.

The real reasons in these cases are not given; the answers are sufficient because everybody perceives that they represent more than is stated. We all understand that it is desirable that we should preserve our health and avoid what would endanger it, and this general premise serves for numberless ordinary questions, but where there is no well understood general premise, similar answers would be insufficient, as in the following cases:—

Why do you live there?

Because it is near the river.

Why is Calcutta hot?

Because it is near the equator.

In these cases the answers given are not sufficient, for we could only guess why a person wished to live near a river, and the answers to the second question gives no real explanation in itself, and it can only be sufficient when a person's knowledge enables him to supply omissions.

In other instances answers given have no claim to be considered reasons, as—

Why don't you admire Cromwell?

Because I detest him.

Why do you leave London so early?

Because we always go away in June.

Why don't you go to Scarborough?

Because I never go north.

These are no better than the famous "Why don't you?" "Because I don't;" which have so often done duty for reasoning.

Of course it may frequently happen from the nature of the thing that a person can give no reason. This is particularly conspicuous in matters of taste. People have preferences for which they would find it hard to account. They only know they like certain kinds of music, poetry, painting, better than others, some flowers better than other flowers, and so on. As reasoning here is almost entirely out of place, it would be better to avoid treating these things by logical process, and wasting time by an attempt at argument. If a person says he does not like Gothic architecture, or Handel's music, it is as hopeless to ask for a reason as it would be if he expressed similar sentiments with respect to potatoes or melons. He does not care for them, and there's an end of the matter. Let the student then endeavour to distinguish between matters of taste and matters of principle. Our likings are largely beyond our control, depending as they do upon inheritance, early influence, acquired habits, and agencies of an organic character; our opinions stand on a different footing, and we ought to acquire them by a process of reasoning, and feel some better justification for holding an opinion than inheriting it, or worse still, picking it up at random.

THE SENSES.

THE FIVE SENSES AND THEIR ACTION.—THEIR HELP IN FORMING THE MIND.—VALUE IN EARLY LIFE. —FALSE IMPRESSIONS THROUGH THE SENSES.— INFLUENCE OF CULTURE UPON THE SENSES.

In close connection with the mental faculties already discussed there are the powers called Senses. These are known as Seeing, Hearing, Taste, Smell, and Feeling. Every student should know something of these and their intimate relation to the mind. Indeed, without them there would be no mind. It is a very old question whether, independently of the five senses, man could have a thought of any kind. Some philosophers think that there might be such an innate idea as a consciousness of one's own existence; others, however, maintain that, were the senses absent, all ideas whatever would be impossible. Without attempting to enter upon a difficult question like this, it is sufficient to observe that from either point of view the importance of the senses is recognised, and they are practically regarded as responsible for the existence of the mind—so we may fairly put it this way—*No senses, no mind;* that is, if a human being were born without the power of seeing, hearing, taste, smell, touch, he would be something like a plant, with as little thinking power as a cabbage. Should these senses be blunt or ill-trained, then the mental powers will be proportionately deficient. Should one sense be absent, then all ideas based on that sense will be absent too. A man blind from birth must always remain incapable of entertaining any idea connected with light or colour. A blind man was once asked what his notion of scarlet was, and he replied that he thought it must be like the sound of a trumpet. So it is with the other senses, each is the source of certain kinds of experience which we can get in no other way; and it follows that a complete set of mental powers can co-exist only with a correspondingly complete set of senses. To make this clearer it will be necessary to consider the senses in detail—first, their nervous working; second, their mental action; and lastly, the reflex action of the mind upon them.

Feeling.—Each of the five senses tells us something of the world around us. In its simplest condition we call this something a property. When we feel a stone we experience a resistance to our touch which we call hardness; exercise the touch again on other substance, we distinguish such properties as heat, cold, roughness, adhesiveness, and others. This sense of Feeling can be employed by all parts of the body, but it is more particularly conspicuous in the tips of the fingers. The tongue, however, surpasses even the fingers in delicacy of action, being able to detect the presence of the finest hair. In the working of this sense nerves are called into play. These nerves are called sensory to distinguish them from motor nerves, which are charged with the duty of contracting muscular fibre. These functions are not necessarily restricted to separate nerves, a nerve may be motor and sensory by turns.

Touch may be considered as a more definite term for feeling, as when we use the tips of the finger deliberately for the purpose. The ends of sensory nerves, where the sense of touch is delicate, are raised into conical elevations, called papillæ, the outer skin covers them, as nerves are so sensitive that without protection every exercise of this sense would be painful. In the sense of taste, the papillæ, or nerve ends, are of different shapes, and are most numerous at the back part of the tongue. The sense of *Smell* depends upon immense numbers of nerves in the nasal cavity. *Hearing* depends on bodies vibrating, and communicating their vibrations to the air around, which is thrown into spherical waves. Some of these vibrations enter the ear, strike the membrane of an organ called the drum, and set it vibrating; certain bones transmit these vibrations through fluids to the membraneous labyrinth, where they strike long filaments in connection with the nerves of hearing. It is thought that each sound affects a separate filament, as one tuning fork may be made to vibrate where another sounds the same note, or one harmonic with it.

Vision, like the other senses, is a kind of touch. Waves of light enter by the pupil of the eye, and, after passing through several transparent substances, the principal of which is called the crystalline lens, strike against the nervous tissue called the rètina. By the action of the lens, a small inverted image or picture of whatever we look at is thrown on the retina in a manner similar to the action of the photographer's camera. When the waves of light reach the optic nerves, the sensation of seeing is experienced.

Though these powers are natural, and as essentially a part of the physical organisation, as a man's fingers or bones, their value is enormously increased by experience. Cooks and epicures develope taste, seamen keenness of vision, musicians delicacy of hearing, and so on; and no doubt almost every person's experience will furnish him with similar illustrations in his own case. The difference in people is very striking. Some seem to be incapable of employing the senses in any but a slow and defective manner, and are consequently inappreciative of much that is going on around them. There are several causes for such a state of things, such as constitutional feebleness, deficiencies of early training, and the lack of that knowledge which, by its reflex action, guides the senses in their functions, and by interesting us in the working of our own powers, stimulates and widens the range of their employment. We see how children revel in the use of their powers; they want to see, hear, touch, taste, and smell everything. This is one cause of the restlessness displayed by healthy children, and if this characteristic is properly superintended, and children are encouraged to make a good use of their eyes and ears, it is an advantage so great that nothing afterwards can compensate for the want of it.

Important as the senses are, they may and do give us false impressions. No one of them is to be depended upon under all circumstances, and it is necessary to bear this in mind, or we shall unconsciously act as agents in the practice of self-deception. To account for this is easy enough. The action of a sense depends somewhat upon its condition at the time, and may also be largely influenced by our hopes or fears. It is said that Faraday was so conscious of this that in important investigations he did not trust entirely to his own observation to determine the real result of an experiment. If we wish to see certain things we shall be very likely to see them, and if, as may well happen, our views are narrow and prejudiced in certain cases, the mind will enslave the senses, and compel them to confirm any preconceived opinion by corresponding sensations. So we see, what we wish to see, hear what we wish to hear, and fancy ourselves infallible. As knowledge of these matters is our best protection against the errors of ignorance and the fallacies of the senses, it will be useful to look at a few details.

Fallacies of Touch.—In judging of temperature we rely upon the sense of touch or feeling, but in many cases this sense deceives us. The air of a deep cave will feel warm in winter and cold in summer, though there is no change except in ourselves. When the temperature of a room is uniform, some objects will appear warmer than others; if highly heated, metals will appear warmer than the carpet or woodwork; if the room is low in temperature the relative heat of the objects will be found reversed; the metals are cold, and the carpet, by comparison, warm; and yet they are all equally cold or warm, as the case may be. The sheets of a bed feel cold and the blankets warm when really at the same temperature. In the case of the following experiment two opposite impressions may be experienced at the same moment from the same substance. Take three vessels of water, one hot, one cold, and one tepid; plunge the right hand in the hot water and the left in the cold. After a short interval, place both hands in the tepid water, and the right hand will experience a sensation of cold, whilst the left will feel the same water warm. These apparent contradictions can be explained. The ordinary temperature of the human body is about 96 degrees, and a sensation of cold is produced when heat is rapidly withdrawn from the system; and, on the other hand, warmth is felt when the heat from an object is higher than the system, and consequently enters it. A good deal also depends on the conducting power of objects. Bad conductors carry off and communicate heat very slowly, and therefore are not felt to be cold when low in temperature, or warm when higher in temperature. With good conductors it is just the reverse.

Taste.—If the sense of Taste be subjected to experiments, it will, under certain circumstances, fail in its action. When substances of widely different flavour are tasted alternately, the nerves of this sense are unable to indicate the separate sensations correctly. To such an extent may the sense be disturbed, that if the eyes be blindfolded and wine and buttermilk be tasted alternately, after a few repetitions it will be impossible to distinguish one from the other. We thus see how the judgment may be led astray in the exercise of taste; the same substances may be sweet, insipid, or even acid, if the nerves of taste have been strongly affected by some opposite flavour. In fact, tastes to be judged advantageously should succeed in a certain order.

Smell.—The nervous mechanism, too, of smell is easily deadened by excessive action. The most delightful odours can be enjoyed for a short time only. A person using musk or camphor is insensible to these powerful odours after a few hours. Noxious odours produce similar effects, entailing, in that direction, it may be, more serious consequences than the temporary loss of the sense.

Hearing.—Hearing, too, may become insensible to constant sounds. We are not conscious of the ticking of a clock for this reason; the sound of a waterfall is unheeded by those always near it; the noise in busy streets, the whirr of machinery, the scream of railway engines, and perhaps even the din of a neighbour's piano, pass by the accustomed ear unnoticed. To a person surrounded by constant noises there is something almost painful in absolute silence; on the other hand, the various sounds of busy town life are utterly distracting to a person accustomed to the monotonous quiet of rural scenes.

Seeing.—But of all the senses, vision is the most easily disturbed. "Seeing is believing," says the maxim, as if in this case, at least, there was certainty. A few illustrations, however, will soon show how little dependence can be placed on vision unaided by experience and reason. It may be stated generally that our impressions, whether of the size, form, distance, number, brightness and colour of objects are often partial, uncertain, and even completely wrong. No sense requires so much training and such constant superintendence. If we trusted to its direct teaching, we should still believe the sea flat, the earth motionless, and the sun its satelite. To the eye uncorrected by reason, the stars are merely twinkling lights, the moon as big as the sun, and the entire vault of heaven a hollow sphere revolving round our globe in twenty-four hours. On all sides we are deceived by our eyes. The falling rain, the waves of the ocean, the lightning flash, furnish examples of illusion. The rain-drop looks a stream of water, the wave which rises and falls in the same place seems to rush forward, and the lightning flash brightens the sky with an apparent line of light. In these cases we see objects where they are not, just as in others we fail to see them when they are present. Objects may be too small to be seen, as atoms and animalcules in water; too distant, as millions of stars; moving too swiftly, as rifle bullets. The image of all objects must be painted on the retina of the eye, and time is required for this purpose. This time varies according to the brightness of the object, but it is always a fraction of a second. Should an object be placed before the eye and withdrawn within the time required for a sensation, then it will not be visible. Again, when the nerves are excited by the light from an object, the impression remains for a short time on the retina even after the object has been withdrawn; this accounts for a flash of lightning appearing a continuous line of light, because the light emitted from different points remains upon the retina and forms a line. Rain-drops form lines in a similar manner. A lighted stick twirled round in a dark room forms a circle of light for the same reason. Motion cannot be seen when less than a degree a minute, and as each heavenly body has an apparent motion of fifteen degrees an hour, or only a quarter of a degree a minute, the motion is not perceptible. The movement of Alpine glaciers, estimated at one foot a day, is too slow for the eye to detect. Plants grow, and metals rust, and we can only see results. It is a matter of common experience that the apparent size of objects changes with distance. The optical image of a man at the distance of a hundred yards would be a hundred times smaller than at ten yards. We correct this by the help of our experience and a rapid unconscious estimate of the distance. But a different region, with a clearer atmosphere, will put a person out who has gained his experience in England. Through the haze in the atmosphere, making objects look more distant, an Englishman is sure to miscalculate distances in regions like Upper Egypt, where the air is bright and clear.

In judging of form, too, we are necessarily often mistaken. Under any circumstances, we can see only a part of an object at one time, and we have to gain our knowledge of the real form by a series of images obtained from different points of view. Hence the difficulty in ascertaining the form. In ascending a mountain we find it very difficult to arrive at a correct opinion in this respect. Scenes when viewed from different elevations under varying atmospheric conditions, baffle the judgment and almost defy the mental powers to construct a general impression in harmony with the details. In our law courts the evidence of witnesses illustrates the same thing. Contradictory statements are made on oath by persons who firmly believe what they say. In witnessing a dispute between two or more persons, it is easy to see how we may be mistaken as our eyes are directed to one or other by turns. Some incidents we see, others we miss; some, again, we see only in part. Add to this the prejudice and excitement which distract the action of so delicate an operation as vision, and it is not wonderful if several observers of the same circumstances differ in their statements. How conflicting are descriptions of battles and the momentous events of history! Apply the same principles, and there is sufficient reason. A general account of a battle must be based on the testimony of numbers, and the historian's difficulty is to sift the evidence and from clashing statements extract the literal truth if he can. A late professor of history at one of our universities has abandoned the subject as hopeless, such are its difficulties. Even when men do desire to record what they see it is not easy, and when there is an intentional misrepresentation of facts, an undue prominence given to some, a suppression of others, and a greater or less desire to substitute error for truth, the task of the honest historian is hard indeed.

Another difficulty, in addition to what we may term the incomplete action of the senses, arises from association. In tasting the sweetness of a lump of sugar, we encounter at the same time, by the ordinary action of touch, the roughness and perhaps the temperature also. When we touch an object with the finger, we may perceive it to be smooth, hard, and cold at one and the same moment. Look at a bright object and we associate the object with its brightness. It frequently happens that mental operations are mingled with sensations, and then matters are still more complex. Close the eyes and draw a finger across a table, and we have first, the sensation of contact; second, the muscular sensation of fingers to produce movement; third, the sensation of smoothness; fourth, the recollection of previous experiments and a comparison with them; and last, the recollection of previous sensations of vision, giving the impression of extension, flatness, colour, and generally, the sensations that depend on seeing.

Influence of Mind over Sense.—In the ordinary exercise of the senses we avoid confusion from the above causes by directing our attention to the particular sensation we are more immediately interested in, and in some measure avoid noticing what we do not want. This reflex action of the mind upon the working of the senses is an advantage when properly controlled. It is, however, easy to see how dangerous it may be in cases where indolence, ignorance, or prejudice dictates what the senses shall reveal or overlook. In any case the finite and yet complex action of these powers creates difficulties in understanding the world outside; but when the course of our experience has a tendency to multiply these difficulties, when our very familiarity with surrounding objects makes us almost unconscious of their existence, it behoves us to exercise our senses with that conscious watchfulness which alone will enable us to make the best use of them. To make this clearer let us look for a moment at an illustration or two. The mental influence over the senses may be conveniently divided into two types, negative and positive. When the instinctive curiosity of childhood has passed away, and we have become accustomed to the world we are living in, the negative influence comes into play. Books are partly responsible for this, but it is a poor exchange to barter the use of our own powers for the knowledge of books, valuable as it is. There are people whose primary knowledge seems to be limited to a wonderfully small number of facts. Such people seem to see nothing in comparison with what they might. To them one tree is like another, one river like another, one hill like another. As a test the author has challenged a class of students to name the colour of the front door of the house they were in, and simple experiments of that kind have resulted in convincing a certain proportion that mere familiarity with objects does not necessarily make them acquainted with them. It is scarcely necessary to remind the student how disadvantageous it must be to ignore the most familiar facts of nature. The most common are among the most important. Plants, animals, minerals, the heavens, clouds, winds, rain, are surely worth the closest attention we can give them. People are ignorant of themselves even from this tendency to overlook the familiar, and to be observant of nothing that has ceased to be novel.

It is related of Dr. Wollaston that when Sir Humphrey Davy showed him a piece of the metal potassium he remarked, "How heavy it is!" when in fact this metal is so light as to float on water. This is an example of positive influence. Most metals are heavy, and the mind being prepared to find a substance heavy, anticipates and overrides the sense, which, without such interference, would pronounce according to the fact. How characteristic of man to find only what he is prepared to find! "Look for angles in Nature," said an artist to Ruskin, "and you will find angles; look for curves and you will find curves." No doubt; and a useful lesson this is for every student. An artist looks for colours and forms, and singles out the elements of the picturesque above everything else; the geologist looks at strata, the botanist at plants, and the zoologist at animals. The imaginative mind mingles the real and the fanciful.

> " The light that never was on sea or land."

The prosaic mind takes the sober utilitarian view of things. One man sees ghosts; another, like Coleridge, has seen too many to believe in them. What has become of ghosts? The answer is, they were numerous when believed in, and they are disappearing because the modern mind no longer encourages us to look for them. We easily see what we wish to see, is a maxim to be continually borne in mind as a check upon senses working in narrow grooves. It is fine when we can say with Wordsworth :—

> " To me the meanest flower that blows can give
> Thoughts that do often lie too deep for tears ;"

but the mental vision is equally capable of prompting us to look with the narrow-minded prejudice that makes charity and justice impossible. We may see evil where there is good, wrong where there is right. Let the student remember that the world looks pretty much as she encourages herself to see it; and if she wish to weigh all things fairly, to do every cause and every person justice, to be neither narrow, one-sided, nor prejudiced, to enjoy, in fine, the advantage of well-trained senses, the basis of all thought and all voluntary action, she must make good use of her youth, for the time soon comes when the iron bands of habit are too strong to be broken, and she may find when it is too late that some of her noblest faculties are her worst enemies.

EDUCATION.

A WOMAN'S EDUCATION.—PHYSICAL, INTELLECTUAL AND MORAL EDUCATION.—DIFFICULTIES OF STUDENTS. —NOTE-TAKING AS AN ART.—SHOULD STUDIES BE MANY OR FEW?—THE MORAL CHARACTERISTICS AND INFLUENCE OF WOMAN.

WHAT is the best education for a woman? This is a question which is answered in different ways, the truth perhaps being that the position of woman is undergoing such important modifications from the active social forces at work in our time, that the subject may be considered as still in a controversial stage, and thus scarcely within the scope of a work like this except in a somewhat general way. Whilst, however, we admit that the question is not yet settled, there is abundant matter for the student to review in connection with the work of her own improvement; and, leaving extreme points on one side, let us consider the real and essential features of Education, usually defined as consisting of three parts—Physical, Intellectual, and Moral. This is a convenient distinction, but these three divisions are too completely connected to be regarded as absolutely separate and independent. By Moral education we understand the inculcation of good manners or habits in close associations with just principles; Physical education aims at the practice of every health-giving exercise; and Intellectual education takes charge of the faculties connected with the acquisition of knowledge, and tends to the development of a thinking and reasoning being. They act and react upon each other. Roughly, we may say one division encourages goodness, another health, and the third mental acumen. Each is helped by the others. A good man is better for being thoughtful, and goodness tends to the production of the loftiest and best thinking. Good health in the same way assists materially in the support of the mental powers. Some good habits are impossible with a feeble frame, and mental labour of a severe kind is often beyond the reach of the bodily feeble. All these powers then are worth cultivating, not only for their separate value but for their mutual service. So far as such general views are concerned the student can see clearly enough, though there are no doubt widely divergent opinions not only upon details, but upon essential questions. Those who wish to see a woman's education hinge upon pleasing accomplishments, and who upon that ground would exclude many studies that are valuable rather for encouraging thoughtfulness than the fripperies of culture, are not her best friends. True womanly refinement and grace can co-exist surely with extensive knowledge, and a capacity for understanding all that men prize in philosophy, science, and art. Not that a woman needs the possession of profound learning. It is the commonest of mistakes with respect to education to assume that the acquisition of knowledge is its chief object. This is not so. What is needed for man and woman alike is such an amount of training as will call forth every good and desirable feature,—to sharpen, strengthen, refine or repress, as the case may be. As, however, natures differ, the training must be modified to suit circumstances, for, the stimulus necessary for an apathetic student would dangerously excite a nervous one. In a girl's education there is the additional difficulty of deciding what definite goal to seek. Such is the uncertainty and confusion about this matter, that it is common enough to hear girls express their opinion that it is a social disadvantage to know much. A pedantic display of learning is no doubt objectionable, as is any other affectation, whether practised by man or woman; but pedantry, so far from being a necessary consequence of learning, is positively discouraged by a sound system of education. Unfortunately a certain impression has been created amongst the community antagonistic to the cause of woman's education, through a few persons whose enthusiasm, noisy and ill-directed as it is, has been more especially displayed in political questions. It shocks the public propriety to see the gentle traits of woman transformed into the bold and combative manners of a platform speaker. There is an instinctive feeling that this is not desirable; and if a more complete education necessarily tended to thus injuriously affect the character of woman, this feeling would be fully justified. We may, however, regard an outcome of this nature as unlikely, and public opinion will ultimately settle the extent to which woman can usefully take an active part in social and political matters.

As it is no part of the author's plan to prescribe the limits of a girl's education, but to offer such suggestions as may be of service in the work of culture, he will proceed to review the three great divisions of the subject a little more fully.

Physical Education.—In physical education, besides the encouragement of all such exercises as tend to promote the general vigour and health, it is necessary to train more or less systematically all voluntary bodily actions. To walk well, to use the hands and fingers adroitly, to articulate distinctly, are included in the physical division, and care must be taken or these actions will be performed badly. The student must help herself, and check any tendency to slovenly habits in this respect. It is not sufficient that teachers occasionally direct attention to these things. To walk carefully when it is a special exercise is of little use if no attention is paid to the action at other times. This remark applies with still more force to speaking. The student should encourage the strength and flexibility of the voice by speaking and reading loudly, not with the object of always using the voice in this way, but to get that command over it without which even low tones will probably lack distinctness, and sweetness. The remarks made in a previous chapter upon the senses are partly relevant to this division of education. The senses are primarily physical, though largely associated with the mental powers, and a good deal may be done in youth to preserve and improve them. Many become blind through recklessness in the use of their eyes. Reading in the open air, in carriages, in a dim light, is not unattended with danger if persisted in. Young people often forget that they will not always be in their teens, and act as if all their faculties were incapable of injury. Every physical power is strengthened by proper use, but injured by excess. Nature generally points out where proper limits have been overstepped. A sense of fatigue, uneasiness, or positive pain gives warning in such cases, but it is best not to urge our powers to this extreme; knowledge and the practice of self-control ought to be our ordinary guardians. The question of hygiene generally is so important in its relation to the whole work of education that too much care can never be taken to impress upon the young the necessity of knowing and obeying the laws of health. Thousands perish through ignorance and carelessness. Abundant exercise of a vigorous character, early hours, plain food, and pure air are some of the factors of good health. Nothing can exceed the recklessness of young girls in these matters, but it is the recklessness of ignorance. They get heated with dancing, and then sit under an open window to enjoy a draught that may kill them. They are often very reluctant to take proper exercise, and in various other ways take but little care either to know or conform to the simplest laws of health. In matters of clothing, too, discretion must be exercised, and the rules of fashion subordinated if possible to those of hygiene.

Intellectual Education.—The importance of intellectual education for woman is pretty generally recognised, but, as was remarked in another page, the question of its depth and range meets with a variety of answers. The majority, perhaps, passively rather than actively, discourage deep and extensive mental culture. That women should be timid in their advocacy of anything in advance of a former state of things is only to be expected from their conservative notions generally. The question, however, is not confined to one sex; it is a matter of the utmost importance to man also. Every mother exercises an almost unbounded influence over the minds of her children, and any deficiency in her powers, natural or acquired, will affect their first impressions and habits. Unless her maternal affection is tempered by judgment her children are in danger of being spoilt. Unless her own education includes some knowledge of hygiene, she may ruin her child's health. And although it is true that a child's earliest training is more physical and moral than intellectual, yet, as ignorance and foolishness are apt to go together, it is necessary for the child's proper guidance that a mother should exercise the tact, system, and foresight that are most likely to be found associated with cultivated mental powers. This is not all; a woman surely stands in need of every mental advantage in the journey of life. The prudence that avoids difficulties, the foresight that perceives consequences, and the judgment that dictates the best course, are surely wanted by a woman. And these things are largely dependent upon training. It is not great learning that is insisted upon. The actual acquirements may be moderate if they have been made to minister to sound culture. Girls are sometimes frightened at the idea of being considered learned, as if this learning had to be paraded before others day by day. Their knowledge, whatever it may be, is primarily for themselves. It is the natural consequence of well-directed effort, and its chief value consists not only in the constant influence it exercises, but in the strength and acuteness the work of acquisition has given to the intellect. These intellectual studies should be at first varied and extensive, in order to give every mental power the necessary exercise. Provided that each branch is taken up fairly as far as it is studied, a certain discursiveness may be permitted. Pope's assertion that "a little learning is a dangerous thing," is a very rash one, for a little learning, if sound as far as it goes, is a very good thing. When the knowledge is one-sided and fragmentary, and large conclusions are drawn from superficial and ill-digested facts, then Pope's maxim applies. The truth appears to be that the young should have their attention turned to many things. They learn, naturally, a great deal in the first few years of their existence. We do not discourage a child in asking questions about all kinds of objects. Animals, plants, stones, water, fire, the heavenly bodies, and a host of other things excite a child's curiosity, and long before the alphabet is learned some knowledge is obtained of such matters. At school additional information may be given, and though the student cannot be expected to go very far into a number of subjects, useful knowledge is obtained, and Pope's sneer notwithstanding, some advantage too. It is right, no doubt, later on, to narrow the range of study; but that concerns rather the period after school, when inclination and circumstances will determine what branches may be cultivated more deeply. The early studies may be regarded as securing an introduction to various branches, and encouraging a taste for study, and the objects of study. Later on, the work assumes a more thoughtful character; the materials acquired, and the strengthened mental powers brought to bear upon them enable the student to engage in the work of enlarging the boundaries of investigation; and by systematising and co-ordinating her facts and principles, she arrives at the full value of her labours, and may then employ her knowledge with advantage to herself and others.

Let the student then regard each branch as valuable in its own place, conferring some special advantage which other branches cannot give; and from this point of view it will be better to encourage devotion to a large rather than to a small number of subjects. Later on some may be disregarded; they have done their service, and time is required for more elaborate work. The student now knows her own powers and tastes better, and can sustain longer periods of labour in one subject than before, though it will be well not to forget that these periods must have their limits, for excess in the pursuit of a favourite study will entail satiety, and even if it did not, the extreme concentration of mind encouraged by this course, produces a one-sidedness which is hardly to be distinguished from narrowness.

The student should note that many regard the opposite course as more desirable. Learn a few things well, they say, and then you can learn anything you like when you have left school. If the young student *could* study a few branches well, this view would be worth more. Young people cannot learn things thoroughly; they cannot work long at a subject, their power of attention in one direction being soon exhausted. Even if this were not the case, there is the fact that we lay the foundation of our tastes and form our habits when young, and if our work be limited, so will our range of subjects be. It is an illusion to suppose the young can make depth compensate for want of breadth, and, in point of fact, too, it is not a very common thing for adults to begin new studies wholly distinct from those engaged in when young, so that those who pay no attention, let us say, to plants, when children, are not very likely to take to botany; they do not know exactly how to begin, and most likely have no taste for the subject; and the same thing might be said of other branches.

Moral Education.—By far the most difficult undertaking in education is the work of fostering a healthy condition of morals. It is easy enough to summarise this into doing our duty to ourselves, to others, and to our Maker; the difficulty lies in the daily and hourly application of this formula. Early training in the habits that good principles dictate, and later on a careful inculcation of the principles themselves, will do a good deal. Young people are selfish and generous by turns, in a more extreme degree than when older. The moral nature, indeed, primarily depends upon certain instincts, and as some of these instincts are strongest in youth, good and evil appear with rapid alternations, and in that period of life may be regarded as a natural consequence of early incapacity for self-control. A very young child is often disposed to be intensely selfish, and cruel, too, in the case of animals. In good hands, features like these are discouraged, and the author may assume that with those who are older the difficulties are not of this sort, at least with girls. The work of moral education consists of two different and opposite tasks—repression and encouragement. With girls, perhaps, the tendency is too strong in the repressive sense. This entails the danger of developing highly artificial manners, a simulation of feelings and tastes which have little or no existence—a smile without, disgust within. Women have often been reproached for their affectations, and some certainly can be traced to the source spoken of. The exigencies of modern civilisation, too, make it difficult for women to play their parts as frankly as men are permitted to do; though it is true that girls are now much less trammelled by restrictive rules in this respect than formerly, and they ought not to forget that this increase of liberty in word and action has its responsibilities. Another tendency encouraged by limitations and repressions is narrowness. This exclusive feeling encourages sets or cliques, looks at one side only, distorts and paralyses the judgment, and is deadly antagonistic to large and generous views. Notable exceptions occur to the author as he writes,—names like Fry, Coutts, and Nightingale, are not likely to be soon forgotten in the country where they are household words. These are, however, but exceptions; and it will be a better state of things when the training of girls accomplishes more in this respect, and banishes the vicious moral perspective by which women are apt to regard little things as big because they are near, and distant ones as necessarily small. It may be urged, no doubt, and properly, that the chief work of a woman is at home; but this is just as surely not the whole work.

In addition to the work of repression, there is the opposite process of encouragement given to certain characteristics. There is no need to point out the value of cherishing such qualities as are almost universally admitted to be morally important, and it can hardly be denied that the plastic characteristics of girls make guidance in this respect easier than in the case of boys, with the natural consequence that women are, on the whole, morally better than men. The author does not altogether agree with a pithy observation once made by an educator of experience that "a girl has a natural tendency to do what she is told, and a boy has just as strong a dislike to do what he is told;" but there is something in it. The person who made that remark probably knew a great deal more about boys than girls. It is good that the young should submit to guidance, that they should respect authority, that they should defer to a riper experience than their own; but it is not good that they should grow up with a confirmed habit of yielding, and with an incapacity for drawing conclusions for themselves. That this is often the case we see on every side, even in matters that are essentially within the scope of things feminine. How else can we account for some absurdities of fashion in dress? We cannot suppose that women exercise their own judgment much in such things. Is it not rather this tendency to do as others do which betrays them into violations of good taste, and forces them to alienate their own right of private judgment upon one of the most personal of questions? This being so, it is hardly to be expected that upon matters more remote a woman will think for herself and avoid the constant inclination to follow others; and in those cases where some women have taken up an independent line of action, they not unnaturally rush to an extreme, and scream for their rights. This tends to create a feeling that the gentle, unreasoning, yielding type of woman is all that is possible or desirable; and between the two extremes it is not difficult to choose.

Perhaps in no single characteristic does woman's nature differ so widely from that of man as in strength of religious feeling. In its best form, this sense of a greater power than human agency—this consciousness of a higher and nobler state of being—is the grandest and most beautiful humanity can attain to. True religious feeling encourages, sustains, exalts, and consoles by turns. How frequently the burdens of life have been lightened by it! the sharp pangs of anxiety mitigated! How often has man had good reason to bless a feeling that cheers him on his way, helps him to fight his battles, and teaches him to win victories over his own pride and selfishness! Of this feeling woman seems to have a larger share than man, and therefore is in greater danger from an excess of it. Perhaps it is scarcely necessary to warn the student that a good thing is not necessarily good under all circumstances. The falsehood of extremes is a great truth. Liberty beyond due limits becomes license, government despotism, generosity extravagance, courage recklessness, self-respect egotism, refinement luxury, and religious feeling superstition and fanaticism. There is a healthy religious sentiment, and a morbid form; and it is no uncommon circumstance to see mysticism in one case, asceticism in another, and hysterical rhapsodies in a third, doing duty for the proper feeling. The ceremonial that may give dignity to prayer and praise easily passes into elaborate forms in which the devotional spirit vanishes, and sumptuous ecclesiastical upholstery takes its place. Woman's emotional nature is readily betrayed into these and similar excesses, and a word of warning to the young may be useful, for the danger is greatest in their case.

Let us cultivate a simple, yet large-hearted piety, ever keeping in mind the Christian maxim of doing to others as we wish them to do to us. The feelings of love, veneration, and devotion may be encouraged by a greater breadth of culture. The grandeur, beauty, and sweetness of Nature's works should be allowed their full influence, and if these things do not constitute religion in its ordinary sense, they form no unworthy foundation for it.

Having glanced at the question of education generally, we may now turn our attention to the chief difficulties in the way of a girl engaged in the arduous work of acquiring knowledge, good habits, and a well-disciplined set of faculties. Among these difficulties may be included:—

1. *Want of good help.*
2. *Too much help.*
3. *Want of method.*
4. *Limited ability.*
5. *Indisposition to work.*

Any one of these disadvantages will seriously interfere with education. Where the student has unsuitable books or inefficient teaching, her labour is seriously increased, and her progress impeded. Perhaps, girls are more likely to suffer from the second disadvantage. In attempting to make learning as pleasant and easy as possible, we may lose the advantages arising from a habit of battling with difficulties; and the more students lean on books and teachers, the more helpless they become. The real pleasure derived from victories won over difficulties is never enjoyed where there has been no struggle. The student should not expect to be relieved from the necessity of making every possible effort in the work of her own improvement because she has teachers. What are teachers for, then? The answer is,—To guide, to systematise the work, to criticise work done, to reprove the idle, to support the weak, to cheer the faint hearted, and every hour of the day to teach by example. There is plenty to be attended to in a legitimate sense without doing the student's own proper work. The younger the student, the more the help required; but year by year the student learns the art of helping herself more thoroughly, and no lessons are so well learnt as those she teaches herself. It is natural enough that students should fall into the mistake of supposing that the more they are helped the better. If the intention be to cram into a person's head a given amount of information in the shortest space of time for a specific purpose, to be forgotten forthwith, it may be—then the process appropriately called cramming meets the case; but for all the objects of real education this system is most hurtful, for, knowledge gained in this way is either not retained, or properly digested, and the student is pretty sure, in consequence, to be disgusted with learning of any kind. Indeed, study, to be pleasurable and profitable, should be an intelligent operation.

Want of Method is one of the commonest sources of failure in serious study. The student no doubt must depend a good deal on her teachers for the attainment of good method in learning, but it may be useful here to insist upon the necessity of working with system, as the tendency to slide into bad habits in this respect is very strong in youth. Without undertaking to write a treatise on the subject, the author may with advantage perhaps offer a few suggestions, more particularly with respect to mental culture. The question of method in study may be considered in relation to work generally, as well as to each subject separately. Here it will be sufficient to take up a few general questions, as special subjects will be reviewed further on. A very common fault is careless reading, such as reading without thought, skimming, trusting to the mere memory. To read properly books of history, science, or poetry, the student should read but little at a time, with great care, however, sentence by sentence, noticing the nature of the facts, tracking the steps of an explanation, weighing the value of an argument, admiring the aptness of a felicitous phrase, or the beauty of a poetical image. Hard words should be looked out, and notes of the reading made. It is often necessary to assure students that even knowing a passage by heart is not necessarily understanding it.

Bad writing again is a great disadvantage. A rather large and distinct handwriting is requisite for students. Where it is made up of small, thin, angular letters, written carelessly, it can only be read with difficulty even by the writer. Careless writing too is very apt to produce bad spelling, as the eye rather than the ear teaches us how to spell. Not only is the labour of reading bad writing heavy, wearisome, and a loss of time, but it is difficult to see the whole of a sentence fairly and judge of it properly. Consequently, bad writing is likely enough to encourage slip-shod, ungrammatical English, as well as slovenly and confused thinking.

Many students take notes of lectures and lessons badly. A very common practice is to write as much as possible, running a race with the speaker, in which he is pretty certain to get a-head. Even if the whole of the lecture could be written it would not be desirable. The entire attention of the student must in that case be given to the mere clerical work; there is no time for thought; no knowledge whatever can be gained during the lesson; and at the end the result is a mass of notes so hurriedly written as to be partly illegible. And when we remember that in point of fact the whole cannot be written, that the notes consist of fragments without system, and the gaps cannot be filled up, it is easy to see that no note-taking whatever would be preferable. The student might then give her undivided attention and carry away a large portion of the matter. The way to take notes is to get down numbers, as they are always slippery facts, divisions or heads of the subject, and all proper names and unfamiliar words. The numbers should be in words, as two millions, instead of 2,000,000. The student may cultivate abbreviated words with advantage in this and some other exercises. Any word recurring frequently in a lecture may be shortened after once writing it in full—even the initial letter would serve in most cases. Whatever is written should be very legible, or abbreviations, a day or two afterwards, will look as mysterious as Egyptian hieroglyphics. As soon as possible after a lecture, additional notes should be jotted down by the help of the memory. After due thinking, the substance of the whole may then be written out with some regard to the language employed. In addition to the gain in actual knowledge and practice in the use of language, lectures and lessons taken up in this way exercise the student in attention, comparison, quick decision, and memory.

By way of illustration the author's Notes of a lecture on Geology by Professor Ramsay are given :—

GEOLOGY.

Extent of Modern Science.
Definition of Geology.
        Ramifications.
        Use.
Rocks—Aqueous and Igneous.
    Structure.
    Igneous Rocks—Amorphous or Crystalline.
        Ex. Lava. Granite.
    Aqueous Rocks. Ex. Sandstone.
    How to know Rocks.
Maps, Geology, Use of.
        Strata.
        Lansdowne Hill, Bath.
        Ages of Rocks.
Fossils—Teaching of.
    W. Smith's Succession of Life.
Primary or Palæozoic Rocks.
    Silurian S.

Old Red Sandstone.
Carboniferous. Dean Forest.
Secondary—Lias.
Oolite.
Chalk.
Tertiary.
Fossils, Differ.—Nearly absent in O. R. Sandstone in England.
Eight thousand feet.
Gaps between S. in Fossils.
Distinct (nearly) in Oolite, Chalk and Tertiary.
Mixed R.
Igneous R. & Strata mingled in Sil^{n} R. in B. Isles.
Also Carb. S. in Scotland.
Tertiary—no igneous R.
Alteration.
Method in Study of G.

Where there is a positive want of mental capacity, the work of education necessarily resolves itself into doing not what is desirable, but what circumstances permit. The student should not be too ready to underrate her capacity. Sometimes this is done through diffidence, but not infrequently through an indolent dislike to labour. As people's gifts vary—though perhaps not so much as is supposed—some get more credit when young; a good memory, in particular, being a conspicuously measurable power, is seen to advantage by the side of higher qualities that attain strength slowly. Many eminent persons appeared dull, or in no way remarkable, when young. It is not easy, then, to decide upon the question of a student's capacity when young, but we may be sure of this, that in any case there will always be an advantage in the employment of patient and persevering labour, and that it will not answer, even for the quick and intelligent, to be idle, much less for the student of average capacity. Patient labour, indeed, may do almost anything; and a habit of doing good and regular work is one that will almost compensate for the lack of positive talent; so that we have one great man declaring that "genius was patience," and another has defined genius as "an infinite capacity for taking trouble." It is a common mistake among students to suppose that geniuses need not work, everything coming to them by intuition. Biography teaches us better. The great men and women of the world have been hard workers when young. Milton, Newton, Humboldt, Napoleon, and a host of poets, philosophers, warriors, and statesmen of every age and nation show this. Even the apparent exceptions illustrate the value of work. The extraordinary performances of Paganini on the violin seems almost as great an exception as could be named. His playing was so astonishing that it was commonly supposed he owed his skill to supernatural aid. No man could display that special power which distances all mere talent, which stands alone, an indefinable and heaven-born gift, more than Paganini. If we look at his history we shall see that work had a good deal to do with this extraordinary skill. As soon as he could hold a violin he began to learn. He was beaten by his father for the least fault. For ten or twelve hours he would try passages over and over again, till he sank prostrated by fatigue. He studied, wrote and played incessantly, and then burst upon the world a master of his art without a rival.

Where there exists an indisposition to work, the student may be sure that her education will be seriously defective, not only in the extent of her acquirements in the scholastic sense, but in the strength and completeness of her mental and moral character. Sometimes we see indolence alternating with spasmodic energy. This is not satisfactory. It is an error to suppose that periods of inactivity can be compensated for by excessive exertions at other times. Extremes are bad in working, as in other things. Excessive efforts soon produce exhaustion, if not illness, and then work must be laid aside. A large amount of steady work may be undertaken when the system has been gradually trained to bear it. A weak man who is accustomed to carry heavy burdens will outlast a stronger one who has not practised that kind of work. So it is with work of all kinds; and if, too, a judicious use is made of variety in study, as different powers are employed in turn, the danger of breaking down will be far less. These powers should not be forced too much in one direction. Even when there is a great desire to labour at a particular study, it will be found an advantage to do a little with all our might, and then take up something else. It has been observed that when a student has had only one particular study in hand, she has not made more rapid progress than others who have taken it up as one of several. And, in addition to this, there is the certain reaction from excessive labour in any one pursuit. Satiety, weariness, and finally disgust, are the inevitable consequences. Upon this point the student may take as a maxim—plenty of work, varied and thorough; and, strange as it will seem to some, they may find themselves in the novel position of enjoying the work they once disliked.

RANGE OF HUMAN KNOWLEDGE.

MAN AND HIS KNOWLEDGE.—BACON'S CLASSIFICATION OF HUMAN KNOWLEDGE.—HERBERT SPENCER'S ARRANGEMENT.—THE SEVEN DIVISIONS OF COMTE, MATHEMATICS, ASTRONOMY, PHYSICS, CHEMISTRY, BIOLOGY, PSYCHOLOGY, AND SOCIOLOGY REVIEWED.

IT will be useful here for the student to glance at the subject of human knowledge in general, to measure in some degree its range, and thus acquire, so far as may be possible, a sense of the proportion her own studies bear to the whole in all its vastness. There are some advantages in a review of this kind. To see something of the whole gives a better sense of the magnitude of a part, and although the consciousness of this vastness may discourage by showing us how little the individual can hope to acquire, on the other hand, there is the advantage of being able to measure more accurately what we know or may aspire to learn. The nature of each branch of knowledge is more distinctly recognised when its boundaries are drawn; and the various relations, near or remote, of different branches to each other, can be made much more intelligible by systematic classification. To know something of the real scope of a subject that we can never study is better than absolute ignorance. We are ignorant still, it is true, but it is not the ignorance of the Esqimaux, who think that all the world is snowclad and treeless. In addition to such advantages as these, it may be urged that a general review of this kind increases our acquaintance with man himself. We see better his position in the complex arrangements of the world. His relation to minerals, water, air, fire, plants, animals, and a host of phenomena, is clearer to us. What a stupendous illustration, too, of man's own power have we in the aggregate knowledge of human kind, and the history of its growth! Here we see at work the curiosity that enquires, the patience that waits, the energy that battles. Within and without, agents push men forward. Hunger gave him a knowledge of plants and animals, and put weapons and tools in his hand; water made him a ship-builder and navigator; the sun and rain impelled him to erect houses; envy and ambition made him a warrior; vanity and necessity led from hieroglyphics to books; veneration made him an astronomer and a creator of false gods; living in community produced laws, governments, and endless social customs; and his æsthetic instincts, poetry, music, and other fine arts. The slightest circumstance has led to important creations. The electric telegraph, the mariner's compass, the telescope, spring from the most insignificant beginnings. The world is ransacked for objects of utility. Nothing so mean but it may minister to man's service; nothing so difficult but he aims at subduing it. This lord of the earth conquers the fiercest wild beasts, cultivates the ground, crosses the widest oceans, spans rivers with bridges, makes air, water, steam, light, electricity, attraction —nay, the sun itself do his bidding. More and more widely extends his realm. The stimulus of civilisation in all its ramifications is for ever urging him to know and to do. He seeks to reveal the history of the rocks below his feet, he measures and weighs heavenly bodies, he analyses sunbeams, he examines the beds of deep oceans, he soars miles above the surface, he catches and retains lightning, he ransacks the earth for traces of ancient nature, puzzles himself over the mysteries of life and the workings of his mind, and loses his way in a vain attempt to scale the heights of the infinite. One by one the secrets of nature are revealed to his enquiring gaze, examined, named, and classified as laws, to become agents in further research, or be quickly embodied in a creation of his own. In presence of all this accumulated experience—this heritage of ages—a sufficient and useful classification which shall include every branch of human learning seems a difficult task. It is not, however, impossible, though it is, perhaps, too much to expect complete success. In Francis Bacon's "Advancement of Learning," all knowledge is arranged under three heads, thus:—

I. HISTORY.......	*Natural,*	Creatures. Marvels. Arts.
	Civil,	Literary. History proper. Ecclesiastical.

II. POETRY. ……	Heroic or Narrative. Dramatic or Representative. Parabolical or Allusive.
III. PHILOSOPHY.	Divine or Theology. Natural. Human.

History Bacon assigns to the domain of memory, Poetry to the imagination, and Philosophy to reason. The subdivisions of history show that Bacon includes under this head records of every kind,—everything, indeed, in the shape of facts respecting not only man, but animals, plants, and natural phenomena. As this classification of knowledge is not intended to do more than serve the minor purpose of illustrating a great philosopher's view of the subject, it is not necessary to give the numerous subdivisions of this system, or to discuss its adequacy beyond stating that it depreciates the natural sciences and relatively exalts poetry. Since Bacon's time, a large portion of modern science utterly unknown in his day, has been created; and the huge proportions of this kind of learning demand a classification on a wider basis, such as that proposed by Herbert Spencer, arranged as under:—

I. ABSTRACT SCIENCE……	Logic. Mathematics.
II. ABSTRACT CONCRETE…	Mechanics. Physics. Chemistry.

III. CONCRETE	Astronomy.
	Geology.
	Biology.
	Psychology.
	Sociology.

In the classification of Comte, which is most suitable for the author's purpose, the divisions are the following seven:—

I. MATHEMATICS.
II. ASTRONOMY.
III. PHYSICS.
IV. CHEMISTRY.
V. BIOLOGY.
VI. PSYCHOLOGY.
VII. SOCIOLOGY.

These seven groups represent divisions of knowledge, ranging from the subject that underlies all the rest, treating as it does of measurement, to that called Sociology, which may be called the science of humanity. This arrangement illustrates two kinds of order—first, that of their dependence, each on those before it; and second, the order of their complexity and consequent difficulty, for our knowledge of the principles underlying each division is less complete as we proceed. This arrangement also corresponds to the historical growth or development of each division, for man made considerable progress in Mathematics and Astronomy in ancient times; but it has been the work of a more recent period to ascertain the principles that account for physical phenomena. Chemistry is less developed, the laws of Life or Biology present greater difficulties, and those of Mental Science and Sociology being most complex, are the most difficult to discover and connect with their consequences. This, however, will be better understood after a short examination of each division.

I. MATHEMATICS.

1. *Numbers*—as Arithmetic, Algebra, Calculus.
2. *Measurement of Extension*—Geometry, Trigonometry.
3. *Equilibrium and Movement*—Mechanics.

The term Mathematics means science, and among the Greeks, represented the only real science in existence. In our time it is limited to calculations of numbers, measurement of extension, and the primary laws of equilibrium and movement, without reference to the forces that maintain the equilibrium or produce motion.

It will not be difficult for the student to perceive the essential scope of mathematics if these distinctions are considered a little. In Arithmetic, questions of numbers in all their various relations are treated of, and the various processes are reducible to *adding, subtracting, multiplying* and *dividing*. Through all these there runs the invariable feature of measurement. Strictly, indeed, it might be said that measurement is associated with the condition and working of all laws, and this is so true that all sciences, properly so called, are based on mathematics, though it is convenient to limit the value of this term, as in the other six divisions, to the chief principle represented by each. Measurement, then, is the essence of mathematics, and every question is more or less mathematical as it includes this feature. In Algebra and the Calculus, advantages are secured by employing, in addition to the ten Arabic numerals, and the various signs to indicate operations and relations, symbols for known or unknown values. By this means problems inaccessible to mere arithmetic are solved, and the range of numerical calculation enormously extended.

Geometry is the division that treats of *extension.* As extension depends upon boundary lines, this subject is the study of lines in their innumerable relations, and, as a whole, is perhaps the most remarkable piece of human reasoning in existence. The principles established by geometrical reasoning like those in numerical reasoning may be applied to almost countless purposes. Mensuration, Engineering, Astronomy, Optics, and Architecture are examples of the practical application of Geometry and Mechanics to different purposes.

Mechanics, another important division of mathematics, has for its object to determine the effect which different forces, acting simultaneously, will produce upon a given body when we know the simple movement resulting from the separate action of each, or conversely, to determine the action of simple forces from the known action of several. Where forces neutralise each other's tendency to produce motion, and *rest or equilibrium* is the result, the term Statics is employed; where one force or more produce ***motion*** the term is Dynamics. The key-stone of an arch is in a statical condition, so is a column of quicksilver in a barometer. In each case the tendency to fall is neutralised by other forces, and a state of rest produced. Throw a ball, and you create a dynamical condition for a time. These two terms, Statical and Dynamical, may be employed in connection with many other branches besides mechanics. Any condition of systematic organisation, as the structure of a plant or animal, may be considered its statical condition. By a similar extension beyond its original use in mathematics, dynamical may be applied to the working of any organisation. In the one state rest is the condition, in the other, motion.

II. ASTRONOMY.

Geometrical—Form, Magnitude, and Motion generally.

Mechanical—Motion of Heavenly Bodies, as dependent on Gravitation.

Astronomy is the science that treats of the masses of matter that exist in space—as suns, planets, comets, and meteors, their forms, size, distances, motions, and the action of the force called Gravitation. This subject is closely connected with Mathematics; indeed, the geometrical division is but little else, since it treats of the forms of the heavenly bodies, their size, and the forms and dimensions of their orbits. In Mechanical or Physical Astronomy, however, the principle of Gravitation enters. This force is universally characteristic of matter, so far as we know, and, though its real nature is not understood, it may be described as a pulling force, akin to the action of a magnet on iron. Thus the earth pulls or attracts the moon, and the moon attracts the earth, and both attract and are attracted by other heavenly bodies, with a force that constantly diminishes as the distance increases. This great law is expressed in the formula that "every substance attracts every other substance with a force jointly proportional to the mass of the attracting and attracted body, and varying inversely as the square of the distance." Two conditions, therefore, modify the power of gravitation—distance and mass. At twice the distance a given body exercises four times less attraction; at ten times the distance it would be reduced to a hundred times less, and so on. Attraction depends also on the mass of a body; the larger bodies pull more than smaller ones in direct proportion to their masses. Thus, the earth pulls the moon with far more force than the moon pulls, on account of the earth's mass being much greater. The organisation of the solar system, and possibly of the entire universe, depends upon the working of gravitation. Without it every planet would travel in a straight line, instead of the curve it now takes, for Newton showed that all bodies in motion have a tendency both to preserve that state of motion and to continue it in a straight line. Every question, then, in astronomy relating to the orbits of heavenly bodies involves a consideration of gravitation, and what is called the first law of motion in combination. Thus, in considering the earth's orbit, the attractive action of the sun and earth upon each other must be taken into account, the tendency of the earth to move in a straight line, the masses of the two bodies, and, in addition, the constantly varying attraction of the other planets of the solar system. These varying conditions lead to changes in the velocity of the earth's motion and the form of its orbit. Notwithstanding these apparent irregularities, Kepler proved that there exists a remarkable element of regularity in these movements. In his second law it is laid down that planets in revolving round their primaries pass over equal areas in equal times; that is, a line drawn from the earth to the sun would sweep over the same space in a month or other period as in any similar period. These regular features, underlying apparent irregularities, are very common in Nature's operations. The earth's axis changes in direction year by year, but after long ages returns to the same point; its declination, too, goes through periodical changes.

Astronomy, considered in a more general sense, embraces questions of a physical and even chemical nature. Light, heat, and magnetism are considered in astronomical subjects. The spectroscope, which detects an element by the character of its light, has enabled the modern astronomer to enter upon fields of enquiry unknown to Galileo, Kepler, or Newton, and he now seeks to know the physical and chemical condition of heavenly bodies; and, such has been his success that, it is possible, in addition to facts respecting the distance, size, and motion of the sun, to add that the heated gases of that luminary contain iron, sodium, magnesium, and many other substances. The tendency, indeed, in all branches of human knowledge is, whilst separating into numerous sub-divisions of detail, to overlap each other; and thus astronomy encroaches upon the domains of physics and chemistry.

III. PHYSICS.

Barology—Weight or pressure.
Thermology—Heat.
Acoustics—Sound.
Optics—Light.
Electricity—Electricity and Magnetism.

Physics is the science of masses of matter and the operation of those forces that do not alter the composition of the molecules in these masses. The form and appearance of matter may be changed by certain forces that is, but there is no decomposition, no separation of a substance into its elements. The various physical forces may be arranged under the five heads given, as—

1. *Barology* includes the phenomena that depend on the action of certain kinds of attraction. Thus, gravity gives weight to all solids, liquids, and gases, and, as a force, accounts for a number of phenomena, as falling bodies, movement down inclines, springs, rivers flowing, and fountains. Gravity also preserves the level of all liquids, from the ocean itself to a cup of tea. Unequal pressure also helps to produce winds and other air currents. Cohesion is that form of attraction that causes the particles of a mass to keep together and so

form liquids and solids. Capillary attraction causes the familiar phenomenon of wetting when objects come in contact with liquids, as also the rising of fluids in narrow tubes, and the pores of solids.

2. *Thermology* is the science of heat, which is now, like attraction, regarded as a force. The influence of this force on matter is very remarkable. It transforms solids into fluids, and in other ways exercises a disturbing action, as in cooking food, modifying the tendency of substances to chemical combination, as when fuel burns. There is a very close connection between heat light, and electricity, and they may possibly be merely varieties of one force. The applications of heat on the part of civilised man are very important. By its aid he subdues metals and other intractable substances, melts glass, bakes pottery, and works steam-engines.

3. *Acoustics* is the branch of physics that relates to sound. A disturbance of the air through a sudden blow is termed a noise; a continuous series of blows or disturbances produces a sound more or less musical, and in each case a series of waves strikes against the ear. The sources of such disturbances are innumerable. Falling bodies, running streams, ocean waves, fire-arms, musical instruments, and the vocal organs of animals and man are examples. The science deals with the origin of sounds, nature of aërial waves, their length, transmission, and velocity. It also treats of echoes, vibrations of strings and plates, harmonious and discordant, combinations of sounds, and consequently the fundamental principles of the musical art.

4. *Optics* is the physical division that treats of luminous rays or light. It is now believed that light is due to waves capable of traversing space. Some suppose these waves to be due to an extremely subtle elastic substance called by them *luminiferous ether*. A luminous body is in a condition of great molecular activity; that is, its molecules are rapidly vibrating. This motion acts upon the ether and throws it into waves, and where these reach the retina of the eye, we are conscious of the sensation called light. When this motion is arrested, darkness follows. According to this theory, light is a force acting through a particular kind of matter present in all bodies as well as in space. The analogy between light and sound is very striking, one being an effect of ethereal waves, the other of aërial waves, darkness and silence corresponding to the absence of such motion. When substances are heated they pass gradually from the non-luminous to the luminous condition. Rays are thrown off before the object becomes luminous; these are heat rays. Increase the temperature to 500 or 600 degrees, and in the dark light rays make their appearance. Thus all bodies become luminous if sufficiently heated. Besides the sun and stars, friction, percussion, combustion, and electric action are among the most common agencies in producing light. The chief subjects treated of in optics are the sources, velocity, and transmission of light, shadow, reflection, images produced by mirrors, refraction, and various phenomena depending on it; also the action of prisms and lenses upon light, colour and its

laws, the eye and all matters relating to vision. Spectacles, microscopes, telescopes, cameras, and the spectroscope, are among the most important optical contrivances of man. Light has a host of important relations to other branches. Astronomers, chemists, botanists, and painters are more or less indebted to its help.

5. *Electricity* treats of an unknown physical agent which manifests itself in a variety of ways. It causes substances to attract and repel each other, to produce light and heat, to separate and combine. This agent displays itself in such natural phenomena as lightning and the aurora borealis. As a general division of physics we may include magnetism in electricity, though in detail there are distinctions. Electricity was first noticed in amber when rubbed with silk, and from the Greek word *elektron*, meaning amber, the name of this agent is derived. Though this peculiarity of amber was noticed more than two thousand years ago, this branch of physics is quite modern, as almost all our knowledge of it has been obtained within the last two centuries. Whether this agent is a fluid or a force akin to heat is not determined. It may be produced by friction, pressure, chemical action, heat, magnetism, and other causes. When a stick of sealing-wax is rubbed on woollen cloth or fur it displays a power of attraction for a short time; metals rubbed in the same way, if held in the hand, do not acquire this property. This is owing to the difference in their power of conduction, the electricity in this last instance dispersing itself as fast as it is produced. In order, therefore, to make good conductors

display attraction, they must be insulated or surrounded by bad conductors when rubbed. This accounts for the apparent want of attractive power in the large number of substances called good conductors, when, in fact, all substances possess this electric property. When metals are placed in acids, electricity is developed, and the laws of this kind of electricity form a branch called galvanism, or voltaic electricity, as distinguished from those first mentioned, which form the division called frictional electricity. Magnetism is chiefly associated with iron, and forms a third division. A magnet may naturally attract iron, or be made to do so by artificial means, or a bar of iron may be made magnetic by passing a current of electricity around it; in this case the magnetic property is lost as soon as the current is stopped. For the better explanation of electrical phenomena, it is customary to assume the existence of two fluids of opposite properties, positive and negative. Two substances electrified in the same way repel each other, but attract if in opposite conditions; the same rule applies to magnets. Electricity may be stored and transmitted from a distance, and substances may be electrified or magnetised by induction. As voltaic electricity may be converted into magnetism, so magnetism may be transformed into electricity. The power of collecting, storing, and applying this agent to practical purposes enables man to produce the electric light, to explode gunpowder at a distance, and to decompose water and other substances.

IV. CHEMISTRY.
Inorganic.
Organic.

Chemistry regards matter from a closer point of view than physics, as it treats of atoms and other molecules acting at exceedingly minute distances. This action produces the phenomena of composition and decomposition; that is, certain elements under known conditions combine to form a compound substance; and again, compounds under other circumstances, break up and separate. It appears from what chemists tell us that all the material world is composed of rather more than sixty distinct and apparently uncompounded substances, which they term elements. The greater number of these are regarded as metals—as gold, silver, iron, &c. About a dozen are non-metallic, as sulphur, oxygen, carbon, &c. A considerable number of these elements are very rare, and play an unimportant part in Nature's operations. The most abundant substance is oxygen, which is estimated to form one-third by weight of the earth's crust. It displays a tendency to combine with a large number of the other elements, and is energetic in the highest degree. Without oxygen there would be neither air, water, plants, nor animals.

Chemical action is seen in the simple operation of iron rusting, when atoms of the metal unite with atoms of oxygen, producing the reddish-brown substance so well known. Chemical combination should be distinguished from mere mixing. In gunpowder, for instance, particles of sulphur, nitre, and charcoal are mechanically forced together; but there is no chemical union, and the microscope will show the separate particles of each substance. In chemical combination a characteristic feature is the unlikeness of the compound to its constituent elements. Thus water is composed of oxygen and hydrogen in definite proportions, and is totally unlike either, for hydrogen is very inflammable, and oxygen is a supporter of combustion. Sulphur and oxygen form the compound called sulphuric acid, a substance differing widely in taste, smell, and tendency to form combinations, from either sulphur or oxygen when separate. In addition to the change of chemical properties consequent on combination, we may note other attendant phenomena—*first*, the specific gravity of a compound is usually greater than that of the component parts; *secondly*, the temperature changes, becoming higher or lower; *thirdly*, the forms of bodies are often changed, thus solids may become fluid through their union, two fluids may become solid, and solids may become gases and gases solids; *fourthly*, chemical action often produces change of colour, substances nearly colourless becoming brilliant, whilst in other cases rich colours are destroyed.

Another striking characteristic of chemical combination is the definite manner in which bodies combine; thus water is always composed of one part of hydrogen and eight parts of oxygen by weight. In no case would it be possible to alter these proportions and produce water. Six parts of carbon by weight will unite with eight parts of oxygen to form carbonic oxide, or with sixteen parts to form carbonic acid, and in no other proportions. Besides this definite proportion as regards weight, a proportional relation of volume exists in the combination of gases, thus, to produce water, one volume of oxygen combines with two volumes of hydrogen.

This remarkable proportional relation in chemical combinations has led to what is called the Atomic Theory. According to this doctrine matter is composed of indivisible particles, and in chemical action these atoms combine with a definite number of atoms of another substance. From the relative weights in which bodies combine has been deduced the relative atomic weight; thus, considering an atom of hydrogen as one, we find an atom of oxygen would be eight times as much, an atom of carbon six, gold a hundred and ninety-nine, and so on.

The investigation of chemical laws has added largely to man's knowledge of Nature's operations. The physicist is helped to a better understanding of such forces as light, heat, and electricity; the botanist and zoologist learn what plants and animals breathe; and the astronomer of late years has found that chemistry can teach him something of the composition of heavenly bodies. The labours, too, of the physician, the agriculturist, and the manufacturer, are all largely dependent on the discoveries of chemical science.

V. Biology.

Anatomy—Organisation of plants and animals.

Physiology—Functions of organs.

Biology includes such facts and principles as concern living things, the distinctive chracteristics of which are growth, reproduction, decay, and death. The divisions of the subject are Botany and Zoology. The term organic is applied to the substance of animals and plants, and inorganic to other forms of matter. The various substances entering into the composition of living things such as bones, muscles, and nerves of animals, and the cells and secretions of plants, are called tissues. When the parts of living things are regarded as having a distinctive working character, they are spoken of as organs,—of these the heart, brain, lungs, roots, leaves, are examples. Inorganic substances are infinitely divisible, in theory, at least; but living organic substances are divisible to a very limited extent. In addition to such phenomena as may be regarded as mechanical, chemical and electrical, living things display a property called excitability. This property is highly characteristic of plants and animals, and ranges from the simple action of a daisy closing its petals at night to the working of the nervous system in the higher animals and man.

The functions of living things may be ranged under two heads, as,—

I. *Vegetative Functions of Animals and Plants necessary for maintenance*	Absorption. Digestion. Circulation. Secretion. Excretion. Respiration. Reproduction.

II. *Special Animal Functions necessary for relation*	Locomotion. Sensation. Thought. Voice.

In the first group we have the various functions necessary for building up and maintaining both the individual and the species. Every living thing must be considered as a structure with a power of taking in food, modifying it by a digestive process, distributing it where wanted, and throwing off whatever is superfluous. As soon as this wonderful power of assimilation breaks down, the organism, no longer able to maintain its existence, decays, dies, and is pulled to pieces by chemical forces. In the second group we have a set of higher powers almost entirely confined to animals, including man. These may be called functions of relation as they bring organisms into connection both with each other, and the world of objects about them. For this reason animals are considered more highly organised than plants. By means of these powers an animal is able to walk, fly, or swim, to seek food, or avoid enemies; it possesses the power of distinguishing objects by the senses; it can employ thought for its guidance, and voice enables it to communicate with its fellow kind.

It is easy to see that the study of biological or physiological principles is attended with greater difficulty than physics and chemistry, since in addition to phenomena belonging to these two branches, plants and animals present problems peculiar to themselves, involving operations so intricate in combination and so subtile in action, that the keenest and most patient intellects have been baffled in their attempts to explain the mystery of life.

VI. PSYCHOLOGY.

The science of the mind has engaged the attention of the keenest intellects from remote times, for it is but natural that men who find even an interest in studying the forces of inanimate matter, should attempt to explore the labyrinths of their own organisation, to distinguish the mental forces that constitute it, and trace, if possible, their working and co-relation. It is inevitable that differences of opinion should arise in dealing with a subject so complex; but avoiding metaphysical speculations, mental phenomena may be arranged primarily under the following heads:—

1. *The Sensations, Appetites, and Instincts.*
2. *The Intellect.*
3. *The Emotions.*
4. *The Activities.*

The first group includes the *five senses* universally recognised, as sight, hearing, touch, taste, smell, and one or two others, such as organic life, that is, a sense or impression of processes painful or pleasurable in connection with the tissues of the system. Allied to the sensations proper, there are certain feelings called *appetites*, states of uneasiness, or craving, such as hunger, thirst, sleep, desire of exercise, &c. The *instincts*, in the strict sense, are the activities and capacities of the animal part of our nature. Any power of performing an action without having to practise it is of this kind. In man these inherent powers are not numerous. Children have an instinctive tendency to walk, though some practice is necessary to perfect the power. When any part of the body is suddenly hurt, the remaining part assumes a conformable condition, a cry is produced, limbs are moved, the face is distorted, &c. In animals the instincts are striking, and far more extended than in man. Animals build, migrate, avoid enemies, and select their food by inherent powers of this kind.

2. *The Intellect* arises from the senses. Each sense depends upon the action of nerves, and from continued use the muscles obey more and more readily the stimulus of nerve force. When two or more sensations tend to cohere in such a way that one recalls or revives another, we have the first intellectual phenomenon, called the Law of Contiguity. Through the action of this power a general impression is created from the revival of several sensations at once, when one only is in action; thus the sight of an orange recalls its sweetness, fragrance, and other properties. We associate names with objects upon the same principle. Cause and effect also stand in a certain relation which the mind connects together.

The second law of the intellect is called the Law of Similarity. By this important power we recognise likenesses in identical objects, and also in those which are similar in some degree. If we have made ourselves familiar with such an object as a house, the sight of another house at a distance will recall the mental picture of the first, and supply a knowledge of details derived from former experience. To this faculty we owe our power of identifying the same characteristics running through objects differing in other qualities, as the roundness of oranges, balls, heavenly bodies, &c., also of detecting analogies in natural phenomena, as the common action of attraction in rain falling and rivers flowing. Metaphors depend upon the same principle, as also generalising and applying general laws to particular cases. Indeed, in every great mental operation the law of similarity comes into play, and without it the reasoning of the philosopher and the rhetoric of the poet would be equally impossible.

These two forms of association—contiguity and similarity, represent the primary force of the intellect, but when several impressions are necessary to enable us to recall another, it becomes a case of Compound association. Again, when the mind forms a picture of what has never existed, by the help of what has been experienced, we call it Constructive association. For example, we may picture the house we live in as built of some other material, or in a different position. In designing a painting or contriving the plot of a drama or any other work of fiction, this power is exercised. It is obviously a very important faculty, necessary as it is in reasoning, abstraction, and in every work of an original character.

3. *The Emotions* are sensations associated with intellectual operations, and depend for their character a

good deal on the particular degree of culture in a person. Such feelings as terror, wonder, hope, fear, affection, admiration, humour, and sense of beauty, are of this class.

4. *The Activities* are such powers for action as are associated with the intellect or the emotions, and are consequently higher in the scale than the ordinary appetites. There is, first, a group of desires, such as avarice, ambition, and curiosity; next, a group of habits, which either strengthen an instinct, as walking, or resist one, as obedience. Beliefs, also, are of this class; also imitation, or desire to do as others do. Lastly, we may include that power which obeys rather the general and remote than the near and particular, the active force called the Will.

Beyond the elementary powers of the mind lie others of different degrees of complexity, such as memory, reason, conscience, imagination, &c. For some purposes it is common to speak of these as simple and independent powers; but, in reality, they are properly classed as compound.

VII. Sociology.

This division includes the principles that relate to the organisation of communities, and may be called the science of humanity. This subject is not, as yet, a generally recognised division of learning; but, without attempting a discussion that would be out of place in an elementary work, we shall find a certain advantage in adopting a view which affords a convenient term under which we may range the chief topics that relate to men in community. According to some thinkers, there are sufficient grounds for regarding social phenomena as dependent on principles which may be laid down and co-ordinated in the same way as the phenomena of mind and body in the simple living man. From this point of view we should find it necessary to proceed by dividing Sociology into, first, *organisation*, and second, *activities*. Thus, a certain type of government may be regarded as a condition, a sort of organ in the body politic, and further, as an agent exercising functions and achieving results. Human nature at first sight appears so irregular and complex in its action that it is not astonishing if there is some difficulty felt in admitting a science of sociology. The same kind of difficulty has been felt before in connection with astronomy, geology, and other subjects, and this may be worth bearing in mind.

Having glanced at the claims of this division to take a place in the classification of knowledge, we may briefly enumerate the leading divisions. Of these, eight may be noted.

1. *Political Organisation*, which includes the organisation of the family—the unit of society. Families develope into tribes, and ultimately into nations. The head of each family is the natural ruler, and hence customs arise which, on a larger scale, assume the dignity of laws and governments, and the simple authority and physical force of the man are ultimately organised into the armies and fleets of nations.

2. *Ecclesiastical Organisation.* Religious feelings assume fixed and organised modes of expression and action, and these tending to multiply in number and increase in complexity, ultimately develope a special class of the community who can command the leisure to acquire a complete knowledge of such things. This class usually acquires a large amount of influence based on the mingled hopes, fears, and respect of the community.

3. *Ceremonial Organisation.* In all communities ceremony plays an important part. Over and above the thing to be done, there is the way of doing it. From crowning a king to nodding to an acquaintance, life is wrapped in ceremonies. These take their rise from small and significant observances till, their origin lost sight of, they become artificial, and often so exacting as to be burdensome. To ceremony, authority often owes a factitious strength, religious services a sometimes doubtful attraction, and effete institutions an apparent vitality; but to ceremony also we are indebted for real uses, for it gives order to human proceedings, and dignity, solemnity, and grace to men's actions.

4. *Industrial Organisation.* The growth of organised labour is no doubt dependent on principles. In a primitive condition, man has but few wants, and supplies them himself. In a more advanced condition, slaves are the chief workers. Ultimately, freemen submit to necessity, toil at various employments, and, as the greatest skill is only to be acquired by undertaking one kind of labour only, there is a constant tendency

to multiply occupations and branches of industry. Communities tend to obey the same economical law; some produce food, others minerals, others, again, manufactures, and so on. The jealousy and rivalry of nations check this natural development, but it has made some progress.

5. *Language.* The first vocal efforts of man were probably of a very humble description. Signs of a gesticulatory character would largely supplement such sounds as were produced. In time, languages grow, divide, change, and die. This appears to apply to all languages. Words are borrowed, cut down, combined, and modified in many ways, till groups of languages are produced from one. Nearly all the languages of Europe have thus sprung from an Asiatic ancestor. We may readily see some influences at work in modifying words. Ignorance, laziness, intelligence, climate, and different occupations are agents in this way.

6. *Intellectual Progress.* Communities, like individuals, vary in intelligence and in the rate of their growth. If we contrast modern England with the Britain of Cæsar's time, we see a striking difference. Such a change is due to causes that are pretty apparent. Knowledge is gained from others by intercourse, and from personal experience. This knowledge reacts upon the brain and increases its power. Inheritance benefits from transmitted power, and the next generation starts with increased capacity and an accumulated experience. Circumstances may check this development of intelligence, where all change is discouraged, by government or national custom for instance, and

where rigid institutions forbid inquiry, and the introduction of novelties, and so prevent the acquisition of new experience. In some cases, also, the struggle for mere existence is so great that there is no time for any but the most necessary occupations, as among the Esquimaux. Commerce, war, and printing, are perhaps the greatest factors of intelligence, whilst superstition and tyrannical governments are its greatest enemies.

7. *Æsthetics.* Beyond the desire to satisfy ordinary wants, there is found in man a love of the beautiful. This is rudimentary in savages, though displayed by them in the carving and painting of their weapons and utensils. This liking for the beautiful has a very wide range amongst civilised communities, and is represented chiefly by the so-called Fine Arts, as painting, music, architecture, and sculpture. We see it displayed, too, in a love of Nature's works, as flowers, rivers, mountains, and fine scenery generally. This æsthetic feeling is strongest amongst the most cultivated, though with considerable differences, and furnishes another illustration of the gradual development of man's mental powers. The taste for some kinds of scenery, especially mountains, is quite of recent formation. The ancient fear and dislike of mountains and certain grand natural phenomena, would probably be caused by superstition investing them with nameless terrors. We thus see that science, by substituting the doctrine of natural and beneficent agencies for such erroneous notions, permits the wholesome feeling of love and admiration for natural objects to grow, and

comets that once excited the wildest alarm in Europe are now regarded as highly interesting and beautiful heavenly bodies.

8. *Moral Progress.* The growth of morals follows the usual law of progress. The higher the civilisation, the higher the standard of morality, and the excellence of a civilised man is of a nobler type than the excellence of a savage. Knowledge of right and wrong, like any other kind of knowledge, has to be acquired. It is true that savages display a consciousness of elementary morality, because it is impossible to live in community without some respect for the rights of others, and so circumstances inculcate such lessons; but it is also seen that the virtue of a savage is not infrequently a crime from our point of view. Certain races in Borneo think it a highly praiseworthy act to kill human beings in order to possess a collection of heads. This is not a matter of war, but an assassination obligatory on every man of a tribe, the members of his own tribe alone being excepted from the working of this rule. Beyond this restriction he may get his heads where he pleases. It is obviously a long way from such a rule to the cardinal principle of Christian teaching, to "do unto others as you would they should do unto you." It is harder, no doubt, to carry out this obligation than for the savage to secure the head he wants, otherwise we might feel discouraged at the moderate proportion of Christians who act upon it, in comparison with the universality of the practice mentioned, among the Dyaks of Borneo.

THE ENGLISH LANGUAGE.

OUR MOTHER TONGUE.—ITS IMPORTANCE AND PECULIARITIES. — KNOWLEDGE OF WORDS. — ENGLISH GRAMMAR. — READING ALOUD. — LITERATURE. — COMPOSITION.

ONE of the most important parts of a student's equipment is a knowledge of her mother tongue. It is not only a valuable acquirement as a vehicle of thought and utterance, but it is a necessary agent in the acquisition of knowledge. Indeed, it is useless to expect success in study without it. This seems a mere truism, and yet it is necessary to insist upon it. Perhaps in no other country of Europe is the native language so much neglected by the educated classes. The French and Germans devote a large amount of attention to the work of mastering their respective languages, and they must do so, to write and speak grammatically. The comparative neglect of English in this country is no doubt owing to its simplicity in structure giving rise to an impression, that it is easy to know the language well, and therefore little or no trouble need be bestowed upon it. Where difficulties are recognised effort is seen to be necessary, and this, by giving experience, actually brings about the curious result of producing greater success where the difficulties are more numerous. Thus the Scotch are better gardeners than the Italians. Having a harsh climate, they must strain every nerve to win success, whilst an Italian garden can almost take care of itself. Now, the average educated Frenchman would probably make fewer mistakes in grammar than an Englishman, though the English grammar is far easier. Not that English is without its difficulties; but they are in another direction. There is no difficulty for instance with the inflections. The simplicity of English in this respect is remarkable. For the single word *good*, representing an adjective, there are four words in French, six in German, and thirteen in Latin, all different. An Englishman cannot go wrong in such a matter. In French, gender and number, and in German and Latin, gender, number, and case must be thought of—thus,

English—Good.
French—Bon, bons, bonne, bonnes.
German—Gut, guter, gute, gutes, gutem, guten.
Latin—Bonus, boni, bono, bonum, bone, bona, bonæ, bonam, bonorum, bonarum, bonos, bonas, bonis.

Although English words are in some cases inflected, the language, on the whole, dispenses with changes of this sort, and any comparison with other languages will at once illustrate the superior simplicity of English in this respect. Of course, English has its difficulties, but these will be better reviewed later on.

Let no student fall into the serious mistake of supposing that because she can spell, parse fairly, read ordinary books, and understand generally what people say in the commonplace affairs of life, no further study of English is necessary. It is by no means an uncommon notion, however, and at school it is not infrequently proposed, to abandon systematic work in this direction as being no longer necessary, and also on the pretext that more time will thus be found for French, German, music, and other studies. But let us put it this way:—Can an average student of sixteen or thereabouts read and understand any first-class work in our literature? Has she mastered English grammar? Can she speak her own language with point and elegance, and a nice perception of the value of words? No! Well, then, ought a woman to value such an accomplishment? That is a question that people will answer in various ways, but let no one delude himself with the belief that at that age, work in English may be abandoned because it is no longer needed. And those who are short-sighted enough to fancy they can get on faster with foreign languages by neglecting English, do not take into account how necessary one language is in the acquisition of another. Again and again are complaints made by teachers of foreign languages, "We find our pupils do not know English, and that ignorance constantly impedes their progress, for we are obliged to teach English as well as the language we have in hand." It must not be understood by this that a complete knowledge of English is to be insisted on previous to beginning another language. What ought to be laid down is, that knowledge in our mother tongue should be in advance of any other, so that we can compare language with language. When the student meets with a grammatical principle for the first time in a foreign language that also exists in her own, her difficulties are needlessly increased through her ignorance of what ought to have been known. A German was giving a lesson to an English governess some time since, when his pupil, commenting upon one of his remarks upon the word "*before*," said, "But '*before*' is never a preposition in English." This is the slightest possible of examples, but it helps us to understand something of the difficulty attending both learning and teaching foreign languages where English pupils are concerned.

The study of a language includes five necessary parts, namely: *Word definition*, *Grammar*, *Elocution*, *Literature, and Composition.* These, as studies, may be provided for in school, but as it sometimes happens that they are in the charge of several teachers, the student may find it useful to scan the whole range at once, and consider a few suggestions intended more particularly to encourage the gradual development of self-help in learning.

WORD DEFINITION. We begin to learn language when children by repeating the words we hear, and year after year we increase the number thus acquired. Later on we get words from books and teachers, by a kind of picking up process, there being nothing of system in it. Such words may be very familiar to eye and ear, and yet not be fully understood. Let the student take a few words and try to give their meanings, and she will very probably succeed in surprising herself. Here is a list of familiar words for experiment :—*Up*, *down*, *but*, *smooth*, *edge*, *time*, *hard*, *tough*, *for*, *the*. Here the student must be warned that it is not a definition to merely substitute one word for another, as is commonly done. It is no use defining wise as clever, easy as simple, house as residence. Nor is the matter much better when the word of the definition is a simpler one, as time for tense, reasonable for rational, writings for literature. These have a certain value, but the rule should be—*define by a phrase which does not include the word to be defined.* When a student says subtraction means to subtract one number from another, it is not a definition; it should be to take away one from another, or find the difference between the two numbers. This random and imperfect way of dealing with our mother tongue is inevitable at first, but a certain thoughtfulness will strengthen the good habit of acquiring a knowledge of words in a more systematic manner. And this care on the student's part is all the more necessary in this case, as the amount of direct teaching in word meaning is but small, and if self-action be neglected, the result will be a limited vocabulary and real ignorance of the nice distinctions in the meaning and exact modern application of such words as are supposed to be known. In addition, then, to any direct study of words, as synonymes, the student may with advantage—1. Note and write down all new words encountered day by day, and consult a dictionary. 2. Associate with a word all its modifications and relations. Lastly, read good modern authors very slowly, and ponder over the words employed. In this way she will every day add new words to her vocabulary, and gain a more complete mastery over the old ones.

GRAMMAR. As grammar is often regarded with dislike, and the logic of young people is favourable to the conclusion—first, that a dry subject is always dry, beginning, middle, and end equally—and secondly, that its uselessness is in direct proportion to its power of repulsion, grammar must have its claims insisted upon on the ground of both utility and interest. In this case, as in many others, the student must have a little faith, and, in spite of any feeling to the contrary, adopt the belief that she may in time find abundant interest even in grammar. Even if this were not so, the value of thorough work in this branch is so great, that there is really no option, for without it, scholastic education falls to pieces. Let us see, then, what is to be done. *Spelling* presents the first difficulty, and in English this is a very troublesome thing—but there is no help for it. Freeborn Britons as we are, we are all tyrannised over by an irrational mode of spelling. And there is no credit to be got in this direction. You are expected to spell properly just as you are expected to have ten fingers. The secret of learning to spell is to make use of your eyes. Learn the right appearance of the word. This is an argument for reading slowly and for writing very legibly. It is no use to depend upon the ear and repeat long lists of words. Every word that is blundered over should be put in a list, very plainly written, and referred to from time to time. It is curious to note that bad spelling was formerly regarded very leniently, and even, indeed, like bad penmanship, thought aristocratic. In this special difficulty of grammar, the English language is without a rival in Europe. The Italians, Spanish, and Germans put in their words the letters really needed and no more, so spelling is easy enough. In English, however, to represent about forty sounds we have only twenty-six letters, and hence some letters have to stand for two or more sounds. The letter '*a*' has the largest share of work in this way, as may be seen in these words:—fate, father, fall, fat, fast. All this, however, does not touch the serious question of correct spelling as an acquirement. If we could enlarge our alphabet and reduce spelling to a system, one great stumbling-block would be removed from the path of the learner. An attempt was made a few years ago to revolutionise spelling, but it had to be abandoned. In the new system a line from Gray's elegy, omitting marks or accents, would run something like this:—

The kerfu tolz the nel of parting da.

In the second part of grammar the classification of words is dealt with—the parts of speech, as they are usually called. In addition to such explanations as a book gives, parsing sentences in prose and verse is of course necessary. A suggestion may be made upon this point. To parse well requires a large amount of experience. There is danger that the work may become mechanical instead of thoughtful. The student should be careful to understand the value of the terms, verb, noun, &c. It is a disadvantage to have such terms for the different classes of words, as, being Latin, they do not convey much meaning at first. Thus, verbs might with advantage have been called *time words*, nouns, *name words*, conjunctions, *joining words*, and so on. A similar disadvantage attends the ordinary grammatical terms, as predicate, object, co-ordinate, apposition. Let the student note that the meaning of such terms must not merely be learnt, but understood. It is the teacher's work to constantly explain such things, but the student must think over such explanations carefully to make them profitable. In parsing, too, we must not assume off-hand that a word is a certain part of speech. What is the function of this word, should be asked, and this is particularly necessary in English, as nouns can become verbs or adjectives without change of form; adjectives also become nouns or adverbs without change, and in cases of nouns there is nothing in their forms to indicate when they are objective. In fact, the whole sentence must be closely scanned, and the meaning of it understood, to ensure success in the work of classifying words or parsing.

After words have been dealt with, sentences must be analysed and their structure considered. The rules relating to sentence-making form the division called Syntax. Pulling sentences to pieces to see how they are made is called Analysis. The principal syntactical rules are these seven:—

1. Subjects must be nominatives.
2. Verbs agree with nominatives in number and person.
3. Active verbs require nouns and pronouns to be in the objective case.
4. Adverbs qualify verbs, adjectives, and adverbs.
5. Prepositions require nouns and pronouns to be objective.
6. Every adjective, as such, belongs to and qualifies some noun.
7. Conjunctions unite words and sentences in similar relations.

For all details, as minor rules and exceptions, a grammar must be constantly consulted; but these seven rules embody all the general relations of words in sentences, and must be thoroughly understood as a basis for successful parsing and analysis. In taking sentences to pieces, the student will do well to note that the simplest sentence is formed of a nominative and a verb, usually called subject and predicate, as fire burns; and the first operation in analysis is to find the predicate and then search for the subject. When there are two or more predicates, there must be a similar number of subjects. All other words in sentences besides these are subordinate, and under this general term are distinguished as objects and adjuncts, as under:—

PRINCIPAL PARTS.	SUBORDINATE PARTS.
Subjects.	Objects.
Predicates.	Adjuncts.

Note again, subjects and objects are always nouns, or equal to nouns. They may be ordinary nouns, pronouns, adjectives used substantively, infinitive verbs, phrases, or sentences even, but they stand for some *thing*—that is, functionally—they are nouns. Predicates may be formed by verbs only, or the verb "to be," and words joined with it. All other expressions are conjunctive, adjectival, adverbial, and interjectional.

Sentences are of three sorts—simple, compound, and complex. A simple sentence contains one predicate only; a compound sentence is made of two or more sentences put together, which is just as true of a complex sentence; but a compound sentence is made up entirely of sentences called principal or co-ordinate, whilst complex sentences contain, in addition to principal, one or more subordinate sentences. As a guide, it is useful to know that principal sentences can stand alone, if detached. Subordinate sentences play the part of subjects, objects, or adjuncts, to larger sentences, and, from their nature, cannot stand alone.

Prosody.—The part of grammar that forms the fourth division is called Prosody. This means accent, but

Prosody includes generally all the rules of versification or metrical language. This branch of grammar is often neglected, but it would be easy to show that a knowledge of metre is necessary to those who would write, speak, or read a language properly, for though prosody treats more particularly of poetry, it is valuable for calling attention to accentuation and encouraging more careful speaking and reading. Even for writing prose it is useful, for a cultivated ear will pay more attention to what is called rhythm, and learn to avoid an unnecessary harshness of style. The student, then, will find herself repaid for the time and trouble expended on prosody, especially as the technical laws of verse in English are easy to understand.

In English verse we find four characteristics, namely —*Accent*, *Rhyme*, *Quantity*, and *Alliteration*. The first is always present in a more or less regular arrangement. Sometimes all the even syllables in a line will be accented, as in *Iambic measure*:—

"Forlòrn ! the vèry wòrd is lìke a bèll."

As each pair of syllables in this kind of verse forms a foot, the number of feet in the above line is five, but many other arrangements exist.

The accents may be put on all the odd syllables, as in *Trochaic measure*:—

"Ère the èvening làmps are lìghted."

In some verse every third syllable is accented; the foot then includes three syllables, and is called *Anapæstic*:—

"The Assỳrian came dòwn like a wòlf on the fòld."

Another kind of trisyllabic verse accents the first of the three, and is called *Dactylic*:—

"Knòw ye the lànd of the cỳpress and mỳrtle."

Altogether there are twelve kinds of feet—four disyllabic and eight trisyllabic — each with a distinct name of classical origin. It would not be possible, however, to write poetry in every one of these measures, and all beyond the four reviewed may be called accidental feet, occurring only occasionally, and creating an irregularity in the verse which, like a discord in music, may be an advantage when introduced purposely.

After looking over the subject in a good grammar, the student will find it useful practice to write out passages of poetry very legibly, and mark all the accented syllables, and then separate the feet by bars, as in music. It often happens that a syllable that is unaccented in prose is put in the accented position in a line of poetry; it is there called a metrical accent, as distinguished from word-accent, *to* in this line is an example:—

"Man nèver ìs but àlways tò be blèssed."

In French, unlike English, there are scarcely any emphatic word-accents, so the feet are dependent on the number of syllables merely, and the two languages consequently present a striking contrast to each other in this respect. In studying accent, it will be seen that the accented syllables are not of equal force, whether ordinary or metrical; this will necessarily be of great importance in reading aloud.

The term *Quantity* is used in speaking of the time necessary to pronounce a syllable, and from this point of view every syllable is long or short. Thus, pine, mane, are long; but pin, man, are short. The long syllables are musical, the short decided. When the metrical accent is on the long syllables of a line, the musical effort is very noteworthy:—

"And thou didst shine, thou rolling moon,"

The opposite effect results when the accented syllables are mostly short, and long ones occupy unaccented positions:—

"Do you question the young children in their sorrow?"

In reading and speaking, the long syllables should have the time they require, or the sweetness and full richness of the language are lost. This caution is the more necessary as English suffers from the snapping or barking utterance in common use, through the long vowels being clipped, and the consonants slurred.

Alliteration is a comparatively unimportant feature in modern poetry, though it was essential in early

English and old German. Many old proverbs show this tendency to repeat certain letters, as

"Frost and fraud both end in foul."

The gain from alliteration is seen in the force of Byron's line—

"He rushed into the field, and foremost fighting fell;"

in the melody of Pope's

"Soft as the slumbers of a saint forgiven."

It will be useful also for the student to look over the various combinations of feet and rhymes that make up the principal metres in use, as some knowledge of them increases the reader's interest in poetry, as well as the power to give due effect to it in reading. The principal metres with distinctive names are *Common Octosyllabics*, *Blank Verse*, *Heroic Couplets*, *Ballad Metre*, *Elegiac Verse*, *Spenserian Verse.*

Besides these, there are almost endless arrangements formed by varied combinations of feet, lengths of lines, and recurrence of rhymes. These can easily be distinguished when the student has mastered the six in the list. Names for such forms of verse are usually dependent on the number and kind of the feet used, as Iambic and Trochaic verse of two, three or four feet for disyllabic measures, and Anapæstic and Dactylic verse of two, &c., for trisyllabic measures. In studying poetic literature, this kind of knowledge will assist very materially, as it enables technical distinctions to be drawn respecting the verse of different authors, which prepares the way for a real appreciation of the beauty and truth to be found in the felicitous diction of great poets.

ELOCUTION.—Not one person in a hundred, even of educated people, reads well! Indeed, if we look at things as they stand, it would appear that reading aloud is a much more difficult art than singing or playing pianos. And by reading is not meant declamation, but reading which aims at a graceful and effective rendering of an author. Either reading is really so difficult that few may hope to succeed, in the art or other causes are responsible for this unsatisfactory state of things. To read well is no doubt a difficult art, but apart from this there are other circumstances which will account for bad reading. On consideration, it will be found that a large number of people acquire bad habits when very young, and to early neglect we may ascribe such faults as nasal, guttural, and monotonous pronunciation. Some peculiarities are local, as the Londoner's irregular aspirates, the Scot's *e* for *a*, the Irishman's *oi* for *i*, &c.

These last peculiarities are more likely to be got rid of than a confirmed defective articulation, though experience shows that faults of pronunciation are very difficult to cure. The best course is to take the matter in hand before the habits have become so strongly entrenched as to be almost unassailable. This is a case where self-help is infinitely better than any other, for the chief work to be done is to avoid peculiarities, and remove, by watchfulness, such bad habits in speaking as may have been contracted. The student will, of course, be all the better for guidance and encouragement, but a little care now and then in class will never make head against the evil consequences of negligence at all other times. Let the student speak with a certain regard for speaking as an art, and this care will naturally extend to reading; and that which, if neglected, is imperfect and even disagreeable, will become a correct and graceful accomplishment.

Perhaps the most common fault in speaking English is to emphasise accented syllables to excess, and jumble the others together; so, when the first syllable is the accented one, as in beautiful, it runs something like this—*beautfl;* miserable becomes *misrable.* This reminds us of the man who declared that in writing, all that was really necessary was to put the first two or three letters of a word, and give your hand a shake for the others. Faults of this kind are worse in speaking than in writing, as the syllables jumbled together are usually spoken in a lower tone. In sentences the same tendency prevails, so that such a phrase as "The fear of the Lord is the beginning of wisdom," sounds "*—fear—Lord—gin—wis,*" only four syllables being pronounced. In reading poetry, the recurring accents tend to intensify this fault of excessive stress alternating with jumbled syllables, and everybody must have noticed the singsong style of children as they change the inflections of the accented sounds. This very serious fault of unequal pronunciation produces an effect which foreigners have described as most like barking; indeed, this, and the hissing of our sibilants, combine to produce a very disagreeable impression. And yet our language is a really fine one in all respects. It has the strong accents of German without the guttural sounds, and the sweetness of French without its nasal tones. There are passages in Spenser that, properly read, rival the music of Italian verse; and the grand dignity of Milton's sonorous lines illustrates the capability of English in another direction. Indeed, it lends itself to every conceivable mood of a speaker with a universal success that perhaps no other European language can pretend to; but it must be studied, faults must be eliminated, and good habits encouraged, or its excellent qualities in this respect vanish, and our mother tongue is degraded to the condition of a hissing, barking jargon.

The student may note that good reading depends upon the following points:—

1. Good quality of voice.
2. Due loudness.
3. Distinct articulation.
4. Correct pronunciation.
5. True time.
6. Appropriate pauses.
7. Right emphasis.
8. Correct inflections.
9. Just stress.
10. Expressive tones.
11. Appropriate modulations.

This summary will show how much has to be attended to in this art. In addition to any regular instruction, the student can help herself by constant attention to her own speaking; without this, reading tends to become stiff and elocutionary. Here are a few general and common-sense directions:—

1. Speak and read rather slowly and deliberately.
2. Pronounce all syllables distinctly.
3. Let all words be audible.
4. Note peculiarities of local origin, and avoid them.
5. Discourage vocal defects, as lisping, and nasal tones.
6. Avoid artificialities and affectations of speech, as mincing and drawling.
7. See that you understand the meaning of a passage, otherwise you must read badly.

These are matters within the student's own range of action, and though these rules are not by any means all-sufficient for good reading, they will greatly promote it. Reading in its best form is a high and difficult art, and demands special aptitude as well as study; but all may encourage the practice, and form the habit of reading and speaking fairly well.

LITERATURE.—The study of an author includes four things—*His Life, Works, Language, and Teachings.* It is useful to know the leading circumstances in the career of an author, more especially such as enable us to understand his condition in life and the influence of his surroundings. The writings of some authors illustrate very strikingly this working of parental, social, and political influences. Chaucer reflects the Plantagenet age, Spenser the Elizabethan, and Milton the Commonwealth in their writings. The first work, then, of the student is to get familiar with literary biography, not by learning a string of names with dates attached to them. It is useful to note these dates and base reflections upon them, but a waste of time to attempt to remember the year when every work was written. As the chronological part of the matter presents a difficulty, and must not be ignored, the student should classify by grouping. The simplest plan for a young student is to arrange authors according to centuries; a more advanced and better system is to take literary periods. This is usually done in books, and but little need be said upon the matter beyond pointing out its necessity. In English literature there are five such periods, as—

Anglo-Saxon	down to	1066.
Semi-Saxon	,,	1258.
Old English	,,	1550.
Middle English	,,	1690.
Modern English	,,	the present.

The last three only concern the ordinary student. From the fifth to the thirteenth century the language is more or less dead and unintelligible without special study. Strictly speaking, then, we have Plantagenet English, Elizabethan English, and Modern English, which might be represented by Chaucer, Shakespeare, and Byron, respectively. Chaucer's English is read with some difficulty, as many words are now obsolete, and others have become much changed in form; in his description of a nun he says:—

"Ful fetish was hire cloke as I was ware,
Of smale corall aboute hire arm she bare
A pair of bedes, gauded all with grene:
And thereon heng a broche of gold ful shene."

Of thirty-four words sixteen, or nearly half, are either obsolete or different in spelling; and such words as resemble modern English are generally monosyllables, as *and*, *of*, *all*, *or*, in which there is but little margin for change. Compare Shakespeare's description of Henry V., or Elizabethan English—

"Upon his royal face there is no note
How dread an army hath surrounded him;
Nor doth he dedicate one jot of colour
Unto the weary and all-watched night."

And again, Byron's description of Rome for modern English—

"The Niobe of nations! there she stands,
Childless and crownless, in her voiceless woe
An empty urn within her withered hands,
Whose holy dust was scattered long ago."

Besides classification based on time, authors are conveniently grouped according to their writings, and are spoken of as *historians*, *orators*, *dramatists*, *essayists*, *philosophers*, *poets*, *novelists*, and *miscellaneous writers*.

No sharp lines can be drawn, however, in such cases. A writer like Lytton may be poet, dramatist, historian novelist, and essayist. Still it is useful, and even necessary, to arrange literary works under distinctive heads, though unsatisfactory in many instances as regards authors. A more advanced student will find it best to lay down distinctions for herself, suited to her range of knowledge and type of mind. It is convenient also to classify literature under the two heads of Prose and Poetry; and, as the student will, in all probability, find it more difficult to understand poetry than prose, it is necessary to be equipped with some knowledge of poetry as an art. Mention has already been made of versification under the head of grammar; this, however, is but the first step, and is a matter of rhyme and accented syllables. The second task for the student is to study the nature of poetry generally, and finally there is the work of critically examining and comparing individual poems, in order to arrive at some knowledge of the special characteristics of each author, and develope the power of estimating his merits as a poet. This must necessarily be the last stage, and only long and thoughtful reading can enable the student to reach it.

The nature of poetry may be here briefly considered, as a useful preparation on the part of the student for studying with advantage the works of individual authors. Poetry is justly considered a fine art, because, like the sister fine arts of music, painting, sculpture, &c., its first object is to please. It aims at creating an interest in a subject by resorting to such agencies as excite the various emotions that are calculated to produce pleasure, and in a certain sense there is always some kind of beauty in good poetry. If we analyse the meaning of such words as grand, sublime, majestic, rich, magnificent, imposing, sweet, fascinating, delicious, charming, noble, fine, brilliant, and many others, we find them all representing different aspects of beauty. Whatever possesses these attributes is congenial to poetry. Even the solemn, wild, terrible, and awe-inspiring have this quality of beauty, and are fit themes for verse. A summary of what may be called the bases of poetry will illustrate the subject more fully. The chief sources of interest, then, are—

1. *External Nature.*—Mountains, the ocean, rivers, waterfalls, forests, flowers, birds, insects, heavenly bodies, the sky, storms, ruins, &c.

2. *Fine Human Qualities.*—Heroism, sympathy, tenderness, affection, devotion.

3. *Concrete Expression and Combination.*—Poetry is opposed to abstraction, and favours the use of concrete terms, as representing the objection and sensuous value of objects. In the sister art of painting the same rule applies. An architect's plans do not form a picture; they are too analytic, and, like all abstractions, appeal too much to the intellect and too little to feeling.

Poets may speak of the rolling orbs of space, the golden sun, or the silvery moon, but not so appropriately of centrifugal force or the sun's corona. Upon the concrete principle the poet, like the painter, combines a number of dissimilar objects into one whole.

4. *Harmony.*—When the objects in a picture agree in such a manner as to form a pleasing whole, the result is harmonious. In poetry, too, similar effects

are aimed at. The simplest form of this principle is seen where words and phrases are directly or indirectly imitative. Thus roar, hiss, hush, thunder, sing, howl, imitate sounds; whilst sweet, soft, rough, spring, slow, quick, are imitative in a certain fitness. Language abounding in vowels and liquids produces soft and musical effects; the harsher consonants give force and rugged strength. Carry out the principle of agreement to objects described, and the result is a certain fitness of each to all the others; thus inanimate objects harmonise with each other, scenery with incident, the various characteristics of human beings with each other, and the plot of a drama.

5. *Idealisation.*—This is the heightening of a subject for the sake of effect. In poetry the fancies of the imagination surpass the realities of nature, and we see—

> "The earth and every common sight
> Apparelled in celestial light."

Men and women are nobler; they rise above weakness and selfishness, and triumph over all difficulties. Poetic justice adjudges rewards and punishments equitably, and virtue and innocence are more than a match for their foes. This extension of rigid truth has, however, its limits; for no poet can pass beyond the range of possibilities without danger to the interest.

6. *Plot-Interest.*—In dramas and epic poetry, interest is excited by the uncertainty of the end. The various characters keep us in a fascinating suspense as their career is unfolded by a skilful writer. The vicissi-

tudes, antagonisms, and other relations, of the actors in a story to each other produce a powerful effect, which is almost independent of the language employed, for a story, however rugged in diction, will be read with interest when the plot is skilfully constructed.

7. *Painful efforts must be counterbalanced.*—Since poetry is intended to give pleasure, tragic incidents should be justified. Sympathy is excited by woes, and this is pleasurable when it is stronger than our own sense of pain at the sight of suffering. But unmerited calamities shock our sense of justice unless amply atoned for. In dealing with suffering, poets can illustrate the grandeur and dignity of man, never more finely exhibited than in enduring or defying misfortune.

8. *Poetry is metrical.*—Poetry is not of necessity written in verse, but the use of metre is an advantage, the recurrence of accented syllables producing a pleasing effect like time in music, or the pillars of a Greek temple. In such cases, as in all the fine arts, the principle of harmony is exhibited.

It will be useful here to point out the different species of poetry. We shall find in this case, as in all attempts at classification, no arrangement absolutely complete. Some poems are mixed in character, and can only be spoken of as composite,.but the student will do well to make herself familiar with the definite types in the first instance. These are three, the Lyric, Epic, and Dramatic, or *the Poetry of Song, the Poetry of Narration, and the Poetry of Dialogue.*

1. LYRIC POETRY.

This is essentially the Poetry of Song, expressive of some intense feeling, and may be subdivided into

I. The Song.—*(a)* Sacred, as hymns and psalms, usually short, and each verse complete in meaning; *(b)* Secular, as war songs, love songs, sentimental songs, drinking songs.

II. The Ode.—The loftiest of the Lyrics, and not necessarily intended to be sung, and very often addressive.

Example.—Keat's Ode to a Nightingale.

III. The Elegy.—A pensive poem, partaking of the character of lament; in an intenser form it is called a Dirge.

Example.—Milton's Lycidas.

IV. The Sonnet.—A very short poem, usually of fourteen lines, sometimes descriptive, at others a single feeling dwelt upon.

Example.—Wordsworth's London from Westminster Bridge.

2. EPIC POETRY.

This is the Poetry of Narration and Description, and generally of matters outside of the writer, that is, objective in their nature, though the author appears in his own person and associates his feeling with the scenes. The metre is simpler than in Lyric Poetry. The Epic may be divided into

I. The Great Epic. This is the longest form of poem, and introduces supernatural agency. It is lofty and large in treatment.

Example.—Paradise Lost.

II. The Romance or Narrative of Adventure. This admits the supernatural but sparingly, and the element of love is more extended.

Example.—Marmion.

III. The Tale. This is a complete story with love as the chief feature, though with occasional exceptions when humour or satire takes its place.

Example.—The Corsair.

IV. The Ballad. A short and simple tale, often classed with lyric poetry.

Example.—Lord Ullin's Daughter.

V. The Mixed Epic. This comprises narrative with sentiment, descriptions, satire, moralising and lyrical effusions.

Example.—Childe Harold.

VI. The Pastoral. This is very frequently separated from Narrative Poetry and ranked as a distinct class, with various subdivisions, as the Idyll, Eclogue, &c., and, as the amount of narrative is but small, there is some justification for this. As, however, Narrative is a more essential feature than Description, it would be better to classify such poetry in relation to Narrative, and subdivide according to the different proportions of Narrative and Description.

1st. Where Narrative is predominant.

Example.—The Idylls of the King.

2nd. Narrative subordinate to Description.

Example.—The Excursion.

3rd. Narrative merely episodal.

Example.—The Seasons.

3. Dramatic Poetry.

In Dramatic Poetry there is a story, but no narrator. The course of events is revealed by the language and action of the characters in the play. Where the Epic includes dialogue it becomes somewhat dramatic, and the Drama in its turn has occasionally, by introducing explanatory prologues, assumed an Epic character. Lyric poetry, too, is found in plays. In the Greek tragedies choruses were introduced between the acts to express the feelings of the spectators. In modern plays lyrical passages are incorporated with the play, and express the feelings of the actor. The term dramatic is applicable to matters in real life when there is a display of earnestness, and people act and re-act upon each other, wherever in fact, a kind of scene is brought about by powerful emotions.

Dramatic Poetry is divided into Tragedy and Comedy.

I. Tragedy consists essentially in the representation of the grand and terrible in human experience, the two principal passions underlying the piece being pity and fear. The sight of unmerited human suffering excites these feelings. Grand and heroic struggles with destiny win our sympathy. There is a sense of fear at the sight of woe, and pity for noble but hopeless contests with the inevitable.

The subjects of Tragedy range from the loftiest ideal of the Greeks, where men are represented as of necessity bending to the dispensations of fate to subjects that permit happy conclusions, and may be classified as

1. High Tragedy, as Lear.
2. Romantic, as Othello,
3. Historic, as Julius Cæsar.
4. Common Life, as A New Way to Pay Old Debts.

II. Comedy presents the ludicrous and amusing side of human nature, and illustrates various types of character from broad farce or caricature to refined representations of society, and may be arranged—

1. Genteel Comedy, as School for Scandal.
2. Low Comedy, as Merry Wives of Windsor.
3. The Farce, as Box and Cox.
4. The Burlesque, or Mock Heroic.

In addition to these leading distinctions, a modern drama may be a mixture of comedy and tragedy. Another variety is the Mask, based on supernatural personages, as fairies, giants, satyrs, &c.

The Opera is a modern variety of Tragedy or Comedy, singing being substituted for speaking.

COMPOSITION.—"Writing maketh an exact man," says Bacon in one of his essays; that is, it encourages care in the choice of words and phrases and method in collecting matter. Composition ranges from a mere grammatical exercise to work demanding knowledge, taste, and thoughtfulness. It is not possible to discuss in these pages the necessary means for securing a good style—a matter of much detail and patient labour, but a few observations and suggestions may be of service. Let it be clearly understood that good writing does not come by chance. Those students who are careless in the matter will not find themselves in possession of this power as a matter of course, for they can no more dispense with practice than painters or musicians. It is hardly necessary to insist upon the value of a style of writing that always conveys its meaning even if such qualities as variety, point, strength, and grace be wanting. Regarded, too, as a matter of mental training, composition has important uses. The practice of careful writing promotes a better knowledge of words and grammatical principles, strengthens the memory, and encourages clear and careful thinking. These advantages are also available, so far as they go, for speaking well, a desirable power, for even if we admit the superior value of silence, we may also with equal reason insist upon the importance of saying what we have to say, suitably.

Success in writing is first promoted by avoiding faults. Of these the principal are—

1. *Slang and exaggeration.*—Such expressions may be innocent, and even possess a certain value, but most of them tend to disturb the purity of language, and reduce it to mere jargon. Something of this may be tolerated in familiar speech, but written language, however simple, should be subject to stricter rules.

2. *Fine Writing and Patchwork.*—Everybody has

heard of the rule about calling a spade a spade, and not a horticultural implement, and it would be as well if, upon the same grounds, numberless terms were less frequently used. There are two serious objections to fine words out of place—they are usually less definite, and they give a motley and stilted character to the style. For a general expression one might say a horticultural implement, not intending to specify anyone in particular, but a distinct term must be best for any particular tool spoken of. In this fine style houses are abodes, shops are emporiums, and fires are conflagrations.

Patchwork is a species of writing in which little quotations are made use of in place of common words, as "the festive board" for "table," "the cup that cheers but not inebriates" for "tea," and so on. Where quotations or periphrases are really telling, they are an advantage, but the student should avoid hackneyed expressions of this kind as much less effective than simple and direct language.

III. *Tautology* means the repetition of the same sense in different words, as in the "jocular, free, gratis, for nothing." Addison states a fact three times over in the lines—

> "The dawn is overcast, the morning lowers;
> And heavily in clouds brings on the day."

Cases no doubt occur where expressions almost synonymous are employed to express the meaning more fully, as the "vision and faculty divine" of Wordsworth, but care should be taken to discriminate between what is an advantage and the repetition that is part carelessness and part ignorance.

IV. *Redundancy* or *Pleonasm* is an excess of words or phrases adding nothing to the sense, as "They ascended *up* the hill;" "Universal *all over the world.*" This fault is sure to occur if students are not watchful, as it is partly owing to the numerous synonymous expressions in English. Thus in *ascend* we have the meaning of *go up*, and a careless writer puts the adverb after the verb of Latin origin from force of habit. We see this exemplified in—

Get up—so people say sometimes rise *up*.
Go down „ „ descend *down*.
Leave out „ „ miss *out*.

Many single words are redundant in termination, as isle, island; often, oftentimes; tragic, tragical; poetic, poetical. In such cases the two forms acquire different values; and only careful observation will enable the student to know what usage sanctions in such niceties as politic and *political*, vale and *valley*. In poetic diction, and for the sake of emphasis, redundancy is allowable; but young writers will do well to forego their liberty in that direction till they can be sure that an expression gains by being redundant.

V. *Obscurity*. This fault arises chiefly from—

1. Inaccurate use of words as regards meaning.
2. Careless arrangement of words generally.
3. Careless use of ambiguous words such as pronouns.

The nature of the first fault is readily understood, and need not be dwelt upon. A sentence may be obscure through excessive length, particularly if it deals with a number of incongruous statements. In poetry, inversions and omissions are constant sources of obscurity. The ambiguous words, however, as they may be called, lead to the greatest number of faults. The student will do well, therefore, to keep a constant watch upon personal pronouns, *he*, *she*, *it*, and *they*, the relatives *who* and *which*, the words *any*, *but*, as also adverbs and present participles.

In Alison's History of Europe we read of Wellington :—" He thus succeeded in at last combating the revolution with *its* own weapons, and at the same time detaching from *them* the moral weakness under which *it* laboured."

Who and *which* cause ambiguity when the antecedent is not clearly indicated.

" There was a public-house next door *which* was a great nuisance."

Here *which* may refer to public-house, or the fact of the public-house being next door.

Not creates ambiguity when it is doubtful what is negatived, as " The remedy for drunkenness is *not* to be ascetic." Here *not* may belong either to *is* or *to be ascetic.*

Adverbs lead to ambiguity when they terminate a use and are followed by a clause beginning with a esent participle, as—

" [illegible] the letter, *rapidly* sketching a few details."

Participles are also a source of ambiguity when it is uncertain what noun they belong to, as—

"I did not notice that he spoke, *running* along so fast."

A common fault in the use of the present participle may here be noted. In concluding a letter a writer will say—

"Wishing you every success, &c.,
"Believe me, yours truly."

This is not necessarily ambiguous, as the writer is understood, but if we place *I* before the *wishing*, we see that the sentence can only be made grammatical by substituting a verb in the first person agreeing with *I* as *am*, or *remain* for the *believe me.*

Bad Metaphor. The value of metaphor arises from its clear, forcible, or picturesque qualities. "Strike while the iron is hot" expresses the meaning better than saying "Do what you propose when circumstances are favourable." To be effective, however, metaphors must not be hackneyed, confused, or too poetical for the subject. Worn out metaphors are tiresome and fall flat. Beginners are liable to make confused metaphors through ignorance or inattention to the agreement of the various clauses, as in the following:—"In a moment the thunderbolt was upon them, deluging their country with invaders." It is correct metaphor to speak of deluging a country with invaders: it is equally correct to describe a sudden and momentous event as a thunderbolt; but since thunderbolts do not in a literal sense deluge anything, they must not be described as doing so in a figurative sense. Perhaps the most confused metaphor on record is that ascribed to a member of the Irish House of Commons, which runs :—" Mr. Speaker, I smell a rat ; I see him brewing in the air ; but, mark me, I shall yet nip him in the bud."

Mannerisms. These are tricks of style, a species of deformity, not so characteristic of youthful writers as the faults already pointed out, but to be guarded against as always possible. Sometimes sentences are made to begin with a pet word or phrase, as in Alison's " History of Europe," in which many sentences begin with " *Great as*": " Great as is the reputation," etc. ; " Great as are the dangers," etc. ; " Great as was his influence," etc. Another objectionable peculiarity of style is the excessive use of the parenthesis. A parenthesis is sometimes necessary as an explanatory clause ; but a slovenly writer will introduce clauses of this sort to save trouble. Having begun the sentence, an idea occurs midway, not fitting in with the regular structure of the sentence, and so, to save the labour of rearrangement, he dashes down the parenthesis and passes on. In Lord Lytton's " England and the English " we have an example :—

" Our ancestors founded certain great schools (that now rear the nobles, the gentry, and the merchants) for the benefit of the poor."

In Dr. Whateley's work on Logic there are about four hundred parentheses, a large proportion of which, by a more careful arrangement of the ideas, might have been dispensed with; and some sentences, as in the following examples, required a comma only instead of brackets:—

"An infinitive (though it often comes last in the sentence) is never the predicate."

Another undesirable peculiarity in writing is the excessively long sentence, formed, as it is almost necessarily, of one clause tacked on to another as idea suggests idea. A long sentence is required in some cases no doubt. No fixed rule can be laid down upon this point; but the student may be warned that such things are very much matters of habit, and encouraged to reduce statements to sentences of moderate length, or rather to consider what is necessary. In North's "Recreations" there is a sentence of thirty lines, containing more than a hundred ideas jumbled together; and in Hazlitt's notice of Coleridge we find a sentence of one hundred and ten lines in which the word "and" occurs ninety-seven times. Sentences may be too short also. The effect is then abrupt and harsh, and the style more that of speaking than writing. Emerson's essays abound in passages like this: "Thus do all things preach the indifferency of circumstances. The man is all. Everything has two sides, a good and an evil. Every advantage has its tax. I learn to be content." The direct bullet-like force of such sentences is gained at the expense of grace and melody. Finally it may be pointed out that the student will do well to begin the cultivation of a good style, by avoiding such faults as have been mentioned. There is of course something more to be done than to write in that negative fashion—something of the positive qualities, as clearness, force, and sweetness to be acquired. Clearness may be secured first, and partly, by avoiding the faults pointed out; but the higher qualities of force and sweetness are hardly to be acquired by the direct practice of writing, depending as they do on special qualities of mind. A vivid imagination which pictures details in strong colours, gives force to writing, while sweetness necessarily depends on a due appreciation of melody in language. Something of a musical ear for niceties of sound is the quality required. To assist in these objects we should recommend the student to read aloud the best writers of prose and verse. These are matters, however, which hardly lie within the scope of the few paragraphs that can be bestowed upon this subject in a work which aims rather at drawing the student's attention to important points affecting her culture, than at a complete exposition of them.

HISTORY.

WHAT HISTORY TEACHES. — DIFFICULTIES OF THIS SUBJECT. — THE MOST IMPORTANT HISTORIES; GREEK, ROMAN, JEWISH, ENGLISH, FRENCH, AND GERMAN.—SUGGESTIONS TO THE STUDENT.

ALTHOUGH somebody once called History an old almanack, it is usually regarded as a profitable branch of knowledge. So much, however, depends on the interpretation of the term history, that whilst in its highest sense it is our best guide to a knowledge of human nature, in another and far more common form it may stand as the best representative possible of a useless subject. Let the student clearly understand that history is not a matter of dates, battles, and lists of kings, but an account of human society and its growth. All the passions of man are illustrated in history. In its pages we contemplate the ambition of Cæsar, the patriotism of Hampden, the wisdom of Alfred, the bigotry of Philip II., and the boldness of Luther.

We may learn in history through what difficulty and suffering, man establishes his rights as a freeman; how slowly every useful institution is developed; how hard the fight was and is between right and wrong, truth and error. From the clashing of innumerable forces our modern society comes. Everything we know and practise has its roots in the past, and we should be incapable of understanding the present without some knowledge of that past. Looking at the subject a little more closely, we may classify the leading topics of history as under:—

1. *Government.*—This includes an examination of the origin, structure, working, and influence of the controlling power of a community.

2. *Ecclesiastical Systems.*—This includes an account of the religious ideas and superstitions, ceremonial, also ecclesiastical organisation, its power and relation to the State.

3. *Classes of Society.*—In this division we may include a study of titles or dignities, the tendency to caste, social rules of intercourse, salutations, and all matters illustrating social distinctions.

4. *Popular Life.*—Under this head may be put most of the ordinary manners and customs of a community, such as the relations of the sexes, parents and children, household arrangements, eating, drinking, and amusements.

5. *Industrial Life.*—This division considers the labour question in its various aspects, the state of the arts, the relation of worker and employer, the distribution of commodities, and the nature of the circulating medium.

6. *Æsthetics.*—Here we examine the condition of the Fine Arts, and estimate the standard of beauty attained

by a community as revealed in its architecture, sculpture, pottery, painting, music, and poetry.

7. *Military Condition.*—This division considers the nature of the arms, modes of raising troops, carrying on war, and relation of the military element to the rest of the community.

8. *Morals.*—These may be illustrated by laws, social practices, current proverbs, and the characteristics of the literature.

9. *Intellectual Condition.*—This may be estimated from a comparative view of all that is done by a society in laws, government, art, science, and literature.

History is commonly divided into Ancient and Modern, or Ancient, Mediæval, and Modern. Ancient history may be considered as ending with the break up of the Roman Empire in the fifth century; the mediæval period ends with the fall of the Greek Empire in the fifteenth century, from which we may date the modern period. Such divisions are convenient, as they represent eras of widely different characteristics. In ancient history we contemplate, for the most part, a Pagan civilisation, the mysticism of the Semitic races, the arts of Greece, and the laws and conquests of all-dominating Rome. In the middle ages we see a chaotic state of things gradually taking the shape of feudalism and ecclesiastictism, and Rome again becoming the mistress of the world. The modern period has partly succeeded in throwing off the yoke of these twin giants and devotes its freed energies to a wide range of pursuits. It is the age of the new astronomy, of geographical discovery, and of countless applications of scientific knowledge. It is the age that encourages Parliaments, education, discussion, toleration, great industries. It battles with disease, ignorance, superstition, and tyrants of all sorts. There are faults enough, too, in this modern age, but study the past and see how ill it compares with the present. The picturesque features of moated castles, of knights in armour, and monastic life, really mean a period of feudal harshness, ignorance, superstition, and an almost total absence of rational liberty. "'Tis distance lends enchantment to the view," in this as in so many other cases. It may certainly be urged that one of the great advantages of studying the past is the power it confers of understanding the nature and tendencies of our own age. Woman, through her emotional nature, is not unlikely to be charmed with the picturesque side of things; but none ought to set a higher value on the present age or cherish less regret for the vanished past.

History is often subdivided into special subjects, as Military, Ecclesiastical, Constitutional, &c. In a state of more complete subdivision, it assumes a Biographical character, and when disintegrated to the utmost, each event stands alone, with its date, as—The Battle of Hastings, 1066. This is usually called Chronology, and such lists stand in the same relation to History proper as the words in a dictionary do to Hamlet or Paradise Lost. Here there is room for an observation upon the common practice of learning long lists of chronological tables by heart. This is about as rational as learning a dictionary by heart. No possible good can come from attempts of that kind, but the reverse. Even if such isolated facts are not speedily forgotten, where is the knowledge of human nature that history should give us? Such lists are useful for reference to those who already know the topics from careful reading and reflection, and there their value ends.

In noting the difficulties of this study, we may include first the large number of events to be reviewed and discussed. It is this mass of matter that has suggested dry epitomes and chronologies and the consequent system of cram or mere memory work, which results in disgust for the subject and failure in getting anything worth having. Of course, memory plays an important part in learning; but if the student keeps in view the real object of studying the annals of the past, she will see that the essence of the matter is an intelligent appreciation of the facts she reads about. Let her bear in mind that unless she aims at grasping the meaning of the facts and then seeing their relations to each other, the lessons of history are not learnt. Another difficulty in this study arises from the nature of many of the facts, some of which are too remote from youthful experience to be intelligible. From the summary of topics already given, the student can see the force of this remark. It is easy to understand a battle, but the origin, nature, and working of a particular form of government present difficulties that can only be conquered by slow degrees, even with an intelligent mode of working. Such are, indeed, the variety and complexity of the matter history speaks of, that no one can hope to gain more than a partial knowledge of it. The extent of a person's acquaintance with history must necessarily depend upon the time given to it; but the quality of the knowledge may be good whether the amount of it be large or small. As regards the nations whose annals are most useful for their teachings, there can be no fixed rule, but some are unquestionably of great importance; and of these six may be noted.

1. *Greece.*—The history of the *Greeks* is full of striking lessons. European civilisation begins with Greece, where we see a young and vigorous people animated with a free and patriotic spirit striving after every kind of excellence, and producing the noblest and most beautiful works of art. No other country has ever surpassed her artists, poets, thinkers, and heroes. What heroism can surpass Thermopylæ, what building the Parthenon, or what poem the Iliad? We see, too, how all this greatness crumbles away through internal dissensions and the enervating influence of Eastern luxury.

2. *Rome.*—The history of *Rome* is also necessary to the student. We see a patriotic, hard, aggressive race succeed in establishing a huge empire and rule it with a rod of iron. With what giant-like steps the Roman strode over the world! After his conquests he helped to diffuse the arts of Greece and the religion of Beth-

lehem. The Roman type of humanity is stern and sombre by the side of the sunny Greek, but the masculine energy of the Romans is not without its attractions. An additional advantage in Roman history arises from its connection with that of England, France, and other countries.

3. *Palestine.*—The history of the *Jews* has a value of a very special nature, and no student can afford to be ignorant of it. As Greece gave Europe science, art, and literature, Rome government and laws, so Palestine contributed a religious system which has moulded the morality of the highest civilisation the world has yet seen, and to the Christian the ancient Jews are the most remarkable of races, and Palestine a land sacred to the memory of prophets and apostles, and the ministry of the Man of Sorrows.

4. *France.*—Among modern histories we must necessarily include that of *France*. Besides the light French history throws upon English affairs in consequence of the close connection between the two countries, the annals of so gifted and brilliant a people as the French have a value of their own. More than once has France been the most influential power in modern times, and it would be impossible to understand some of the tendencies of our own day without a careful study of the French Revolution and its disturbing action upon the society and governments of Europe.

5. *Germany.*—In *German* history we see the working of a different political system, and the characteristics of a strikingly different race. The Germans overran

Europe when Rome fell, and by race and language the English are largely German. The annals of such an influential people of kindred race must be regarded with the interest attached to such a circumstance. To the Germans the world owes gunpowder, the printing press, and the Protestant Reformation—three mighty factors in modern civilisation. Gunpowder, by making science necessary in war, has made Europe the master of the whole world of barbarism; the printing press has extended education, created public opinion, and is a great and increasing power; whilst the emancipation of one half of Europe from the yoke of Papal Rome prepared the way for the establishment of national liberty. The world, then, owes much to the Germans, who, with their English and American connections, stand at the head of modern civilisation.

6. *England.*—It is hardly necessary to insist upon the importance of a sufficient acquaintance with the history of our own land. The history of England is intimately associated with the steady growth of free institutions. From the despotic rule of the Norman to our own day, liberty has been growing. The rise of free towns, the Great Charter, the House of Commons, the annihilation of the Norman barons, the Reformation, the two Rebellions, and the Bill of Rights, all tend in the direction of the freedom England possesses, and of which she knows the value so well. The history of England since the Conquest is intimately associated with the growth of its freedom. She has purified her institutions, struck off the fetters of the slave, colonised

new and distant lands, developed industry and commerce, diffused her language and laws far and wide. She has created a new postal system, electric telegraphy, gas lighting, and steam machinery. She is the mother of nations—and free nations—and this is her proudest title to distinction. Her imperial possessions, her ships, her wealth and universal commerce, her victories on land and sea, illustrate her greatness; but in after ages, when her faults and her merits have alike become things of the past, when she shall have played her part and shared the fate of Greece and Rome, surely one grand tradition of Old England will be cherished by her children, the memory of a storm-beaten island that was renowned among nations as the classic home of freedom.

In addition to these histories, there are others, less important, perhaps, but still of value in elucidating the working of human institutions, such as the annals of the Egyptians, the rise of the Arabian Empire, the Italian Republics, Spain, and the United States of North America. These being less valuable, however, than the six first named, the study of them can very well be deferred till a later period.

What is to be done by the student to acquire a useful knowledge of history is the next consideration. A few necessary conditions of successful effort may be pointed out. The nature of the difficulties suggests, in some measure, the course to be taken. These arise from the bulk of the matter, the almost endless names and dates, the extent of territory alluded to, the want of sympathy with people of times and countries remote from our own, and lastly, the difficulty of co-ordinating facts so as to grasp firmly their relations. Consequently, the student must possess a good memory, method in the arrangement of details, sufficient geographical knowledge, an active imagination, and, most necessary of all, the intelligence to make the facts available as material for forming opinions. Let us look at these a little more closely. To make the memory of the best use, care should first be taken that every page is understood; notes, few in number, but discriminating, should be made; a map of the locality should be at hand and referred to, and an outline map should be filled up by the student as the reading advances. To assist the imagination, pictures of buildings, costumes, &c., are important. Antiquities illustrative of the period studied are often accessible, and should be inspected. Later on, travelling to the localities themselves, the self-speaking monuments of the past, helps to complete the work of acquisition. When a history has been read in detail, with every needful care, it will still be necessary to review the whole and classify the events. This should be done by the student herself. An arrangement made for her, beyond needful suggestions, would not answer the same purpose. A history may be first arranged under a few distinctive heads to assist the memory. These should be large and comprehensive, and subdivided to any extent necessary. English history, for example, may be resolved into these seven groups:—

The Roman Period.
The Saxon Period.
The Norman Period.
The Wars of the Roses.
The Reformation.
The Battle for Liberty.
The Constitutional Period.

Royal houses and monarchs are useful landmarks, but periods based on such features are often artificial, and cannot be depended upon to coincide with the natural changes in the national life. Other modes of grouping will readily suggest themselves, as questions of Religion, War, Legislation, Commerce, and all facts having some cohesion by virtue of their relationship. But, whatever the plan may be, the essence of the thing is, that some systematic treatment of facts should be practised.

What is to be done with dates? In every epitome of history there are hundreds of dates, and these may be useful—nay, indispensable—to the narrative. The student should notice these dates, calculate periods by them, and use them to master the history; but it is hardly necessary to say that they were not put into the book to be all learnt by heart. Some dates are very important, and these—a few only, but carefully selected—should be treasured up. It is quite sufficient in many cases to know the period of an event in a somewhat general way; even the century may be near enough. One thing is quite certain, that hundreds of dates learned by rote are forgotten forthwith, and it is almost equally certain that history, taken up in this fashion, is but little likely to win the attention or profit the understanding. Proper names, too, are not all to be treasured up as if every city were Rome and every man a Shakspeare. In Dr. Schmitz's epitome of Greek History, there are about twelve hundred proper names. That fact speaks for itself. It is impossible to know all these names, and if it were possible, it would be a sad illustration of time wasted. They have a value in the narrative, and a considerable number of them are important enough to be remembered, and here the judgment must decide.

As regards the use the student should put her history to after securing it, there is something to be said. The last thing to be done is to form an opinion on the facts of history, and where the matter is important this opinion should be formed slowly. Upon many matters in history it may be well to suspend decision altogether; and, again, an opinion need not, as is often the case, be entirely one-sided. The great events of history are often mixed in character; one may praise and blame the same man and the same period without being inconsistent. If a generous mind pities Charles the First, it does not follow that the weakness and tyranny of his reign should be justified. If history is to be really profitable the student must avoid the error of distorting it to support fancies and prejudices; truth, and truth only, should be sought for and valued by those who study history. The difficulty in the way of forming sound opinions is great, however, since in addition to the bias created by such influences as nationality, politics, fashion, and religious views, historians, themselves, from the same causes, are not infrequently led to present facts in a form calculated rather to sustain their preconceived opinions than to evince their serious desire to find the truth and respect it.

GEOGRAPHY.

RANGE OF THE SUBJECT. — GEOGRAPHICAL FACTS CLASSIFIED AND REVIEWED.—MAP-MAKING—VALUE OF THE EYE IN GEOGRAPHY.—HOW TO DEAL WITH STATISTICAL FACTS.—THE EARTH AND MAN.

A DESCRIPTION of the earth is necessarily a comprehensive subject, or rather a host of facts of the most heterogeneous description associated under one heading. The one object sought is the presentation of a picture that shall reveal the general condition of the whole world. This can only be accomplished by an array of facts and statistics that may well drive the student to despair at the prospect. We find in Geography something of everything:—latitudes, longitudes, continents, islands, mountains, oceans, lakes, rivers, lengths, breadths, and areas, towns, populations, armies, navies, commerce, manufactures, arts, religious systems; nothing comes amiss, from the distribution of the sugar-cane to the British Constitution—from the length of the polar day to the course of the Gulf stream. Everywhere figures, too—the heights of mountains, the depths of the ocean, the lengths of rivers, the areas of countries, the number of inhabitants—the catalogue is indeed a multifarious one, and presents difficulties accordingly. Before, however, discussing the question of method in studying Geography, it will be useful to review the extent of the subject by arranging the chief facts under a few heads:—

1. ASTRONOMICAL GEOGRAPHY.

Size, Form, Divisions, and Movements of the Earth.

In this division the chief topics are latitude and longitude, time of sunrise, solar time, twilight, distribution of light, altitude and direction of heavenly bodies.

2. PHYSICAL GEOGRAPHY.

Land.—Rocks, continents and islands, mountains, plains.

Water.—The ocean, its distribution, depth, condition, and movement, rivers, lakes.

Atmosphere.—Winds, rain, snow, hail, dew, temperature.

Plants.—Distribution and use.

Animals.—Distribution and use.

Man.—Distribution of races.

3. POLITICAL GEOGRAPHY.

Political Organisation.—States, towns, governments, revenue, armies and navies.

Ecclesiastical Condition.—Religious systems.

Ceremonial.—Manners and customs.

Industrial.—Manufactures and commerce.

Languages.—Distribution. Literature.

Fine Arts.—Music, painting, architecture.

Such a bird's-eye view of the subject may be useful to those students who have already acquired a certain amount of knowledge, and stand in need of some classification, for systematising their labours, for storing up facts, and for encouraging the practice of co-relating them. An examination of this classification will make the nature of geography more intelligible.

In *Astronomical* or *Mathematical Geography* the world is regarded more as a whole—a planet rolling along in space. We have to deal with a revolving globe journeying round the sun. From the revolution itself we get the idea of axis, or line of least movement; the two ends of this line are called the poles; midway between the poles a ring of greatest movement is drawn, called the equator; hence the division of the earth into two hemispheres—north and south. Day and night depend on the earth's own movement, and as the sun at noon must be highest to all places on the earth in a line from north to south, it is convenient to speak of such a line, and so it is called the mid-day or meridian line, and as every place is entitled to have one drawn through it, the number of meridian lines is infinite. The limits of the zones depend on the inclination of the earth's axis from the perpendicular to the plane of the solar system. That is, the earth goes round the sun in such a manner as to cause the sun to appear more over the northern hemisphere during one part of the year, and more over the south the remaining part. The boundary lines of the torrid zone are fixed at 23½ degrees nearly on each side of the equator, corresponding to the range of the sun's apparent movement north and south. It is only within the torrid zone that the sun can be vertical. The limits of the frigid zones depend upon the same principle—that is, the inclination of the earth's axis. When the sun is vertical 23½ degrees north or south of the equator, its rays extend the same distance beyond the pole, even at midnight—that is, to latitude 66½ nearly.

The various questions in this division of Geography may all be referred to a few principles, especially to these two—(*a*) the daily motion of the earth from west to east in twenty-four hours; (*b*) the yearly revolution of the earth round the sun, with axis inclined about 23½ degrees. On these depend the subdivisions and distinctions already mentioned, and we may add latitude, longitude, sun's place and declination, day and night, difference of time, variation in lengths of days, duration of twilight, the change of seasons, variation in the height of the sun and other heavenly bodies, daily rising and setting of sun, moon, planets, and many stars. This being the case, the student must understand the necessity of getting clear notions of the earth, in a planetary sense, for, working problems on a globe by rule, and securing answers correct or otherwise will not suffice. Strictly speaking this department of Geography is not unattended with difficulty, especially to those with no knowledge of mathematics. The imagination, too, is wanted, whilst working at these things, to create a mental picture of the earth in its relation to the sun, for, if only a mechanical use is made of a globe, the real height of the subject is not reached, and the study of the globes would deserve the slights and ridicule it has often evoked as something equally pretentious and useless.

Physical Geography treats of the earth's natural features, animate and inanimate. In dealing with the land we have to become acquainted with its *structure*, *distribution*, *form*, and *elevation*. Rocks, reducible to a few leading types, run into almost endless varieties of hardness, colour, and composition. The student should examine the five principal kinds, as granite, and other igneous rocks, sandstones, limestones, claystones, and coal or carbonaceous stones, and a tolerable notion of the chief substances that form the land will be gained. The general distribution of the land can be studied best from a map of the world or a globe, where every piece of land may be compared with every other, as regards size and place. All the land of the world is included in two large continents, eastern and western, and an immense number of islands. To gain accurate notions of position, maps and globes only should be used—not book descriptions The large islands should be compared with each other and classified—that is, arranged in groups, as first class, second class, and so on. Small islands are commonly situated in groups, and may be picked out and arranged according to the sub-ocean they are in, as Atlantic groups, &c. The two great continents should be studied till the memory can recall their extent and form. The surest way to do this is to constantly practise making outline maps from memory. On a slate will do. Not elaborate, highly-coloured performances, but simple lines. Note that the two continents are sub-divisible into two triangular masses each; Asia and Europe form a triangle with the greatest length east and west, Africa is a triangle from north to south, North America and South America also form two triangles from north to south. Begin by making a simple triangle, then mark with dots where large irregularities occur; these are usually peninsulas, as Arabia, India, Greece, &c. Of these there are in the four triangles, or sub-continents, about twenty of large size. By practising making these triangles a good knowledge of them will soon be acquired, and a foundation laid for the introduction of other features, as mountains, rivers, lakes, towns, and states. All these should form the subject of map-drawing in this order: First, the outline, then mountains may be put in, then rivers and lakes, next boundaries of states, and lastly, towns. In all cases of map-making the student should never forget that the real object is to cultivate the memory through the eye. Of course, many things in geography are not to be acquired from maps in any shape; but as regards matters of outline and distribution, there is nothing so useful as the constant practice of map-making from memory. Elaborate mechanical map-copying, however pleasing the result, is a mere exercise in drawing, and has little or nothing to do with the acquisition of geography. Indeed, such performances are almost useless, and do harm by degrading the work to mechanical copying, and dispensing with intelligent observation.

Among the most important features of the land we must reckon mountains. A knowledge of their distribution is gained by map-making; but to appreciate properly the difference in heights, and the varying elevation of land generally, the student should have a standard to measure with—that is, mentally. Take a church, or any elevated building that is well known, to begin with. St. Paul's Church, for instance, is about 400 feet high. Ben Nevis, the highest mountain in the British Isles, is about 4400 feet—that is, eleven times the height. To assist the mind, vertical lines may be drawn to represent comparative heights till such aids can be dispensed with, and the habit formed of mentally measuring every elevation by a standard always present in the memory. A more advanced kind of operation is to make cross sections of countries in this way. Rule a horizontal line, say six inches long, or longer, to represent the sea-level. Look at the map and note the position of mountains and table-lands, and make marks on the line to indicate their position. Ascertain the actual heights from a book, and place dots above the line to indicate the highest points. The scale of elevation must depend upon circumstances, and will necessarily differ from the horizontal. For a line six inches long a quarter of an inch would do for 5000 feet. A cross section thus made will indicate the comparative variation in elevation roughly but usefully.

To learn by rote the heights of all mountains as given in books is useless drudgery. Such statistics, and all others in Geography, should be *studied;* that is, compared, analysed, so as to secure a fair impression.

The practice of comparison may be adopted not only for heights of mountains, but for areas of all kinds, lengths and basins of rivers, populations of towns and countries, first by making a diagram to represent a fact and another of proportionate size to represent a second fact of a similar kind. Eventually, diagrams may be dispensed with and comparisons made mentally. This system is particularly necessary for statistics, as facts of that kind are not readily understood, even though committed to memory. In the affairs of everyday life mental comparisons are made every moment. When we say a day is dull, a tree is tall, a house is convenient, a landscape is beautiful, a girl is amiable, we make comparisons. It is curious to observe how unconscious students are of the most tremendous mistakes in matters of figures. When numbers are large their value is not easily understood. The area, for instance, of the British Isles is about 120,000 square miles. Now, a routine kind of student is just as likely to say 120 millions, or 12 millions, or 12 thousand, or even 120 miles only. And this is the way with figures generally. A student would never make such mistakes with small numbers. She would never say by mistake for 70, that somebody was 700 years old, or 60 feet high instead of 6. She knows the value of such figures by constant comparison, and with care she may avoid absurd errors in large figures.

The next division of Physical Geography treats of Water. There is, first, the great ocean, its five divisions or sub-oceans, about twenty principal seas, and innumerable bays, gulfs, and straits. These are matters of map-making for distribution, and comparison for the study of size. The principal phenomena of the ocean are its currents. The leading current is near the equator, and various branches exist in connection with it. When the distribution of these currents is known, then the causes may be studied, the principal of which are unequal distribution of heat and the rotatory motion of the earth from west to east. The water on the land includes rivers and lakes. Their distribution should be fixed on the memory by map-making—their lengths and basins by comparison. To assist the memory, both lakes and rivers should be classified. There are five or six natural systems of lakes in the world, besides isolated pieces of water. Rivers may be grouped under five heads, according to the oceanic basins they flow into. Principal rivers should be known before the affluents of the banks are looked after. Essentials should be cared for, and time not misemployed in looking up every insignificant stream. We may find it desirable to study some particular district closely, but we must be eclectic in a matter like this, and try to get and hold an intelligent grasp of important facts, and work in such a way that the work itself—irrespective of the geography—will be of service as a mental training. There are many circumstances connected with rivers that should be looked after. Why some rivers are slow and others rapid, why some form deltas and others do not, why rivers inundate their banks more or less, some regularly, others spasmodically. Indeed, the most important rivers have a kind of character of their own, and may be taken up separately and considered from source to mouth with interest and profit.

In the third division of Physical Geography, the Phenomena of the Atmosphere are included. First, there is the composition and extent of this ocean of gas that surrounds the earth to be considered. The chief functions of the atmosphere are to distribute water, gases, and heat. This work goes on unceasingly. Water rises by evaporation from the earth, is formed into clouds which are wafted from place to place by currents of air or winds, and ultimately discharged in the form of rain, snow, or hail. The amount of the rainfall can be measured, and is usually reckoned in inches. Thus, the average rainfall of the British Isles is about 36 inches annually. This is amply sufficient to maintain their verdure—to supply water enough for the plants, animals, and human inhabitants of these islands. As all life on the land depends on the presence of rain, its importance may readily be understood. The student will do well to adopt the practice of comparison, as in other cases, in order to appreciate facts of this kind, and should be able to judge whether a given rainfall is above or below the average. Snow has its uses, though they cannot be considered here. Winds play an important part in Nature's operation as agents of distribution. There are four things to be learned with respect to these—their *origin*, *characteristics*, *distribution*, and *use*. The simplest point is the question of their whereabouts, the most difficult their origin, and that should dictate the order in which they are taken up as studies. Everybody knows that the temperature of the earth is not uniform, being hot in one zone, temperate in a second, and cold in a third. Here there are some points requiring careful consideration. First, there is the primary question of a place being colder in proportion to its remoteness from the equator; then there is the influence of local agents, so that it by no means follows that places equally distant from the equator will experience the same average temperature. We have to take into account the effect of elevation, proximity to the sea, prevailing winds, drainage, and other modifying agents. The final effect of all influences is summed up in a general average annual temperature. For London this is equal to 50 degrees uniformly, and all places with a similar average are said to have the same isotherm. Maps are made to show these isotherms by lines running east and west, and they are very instructive as illustrative of the distribution of heat.

The Distribution of Plants is the fourth division of Physical Geography. A good deal of this is simple enough, especially as maps show the prevailing types of vegetation for different localities. The great variety in plants depends first on the distribution of heat, but so many other circumstances affect plants that the subject of original distribution assumes a very profound aspect. All, however, may learn something of the characteristic plants of different regions, as tropical, temperate, and arctic types. There are types for the sea, the sea shore, marshes, woods, mountains, and other places. Man, too, has largely modified plants, and promoted their distribution. Such plants as yield grain, sugar, coffee, cotton, and many others, are examples. Among the various attempts at systematic plant-geography that of Schouw may be ranked highest. This naturalist divides the earth's surface into twenty-five phyto-geographic—that is, plant-geographical regions, according to the predominant types of vegetation. In each region at least half the species must be peculiar to it. In this way we have the region of mosses, of magnolias, of rhododendrons, and so on.

The Distribution of Animals, forming the fifth division of Physical Geography, is an important and highly-interesting subject. As animals are more numerous in species than plants, they are less completely classified, with the exception of the higher types. Of these there are something like 1800 mammals, 8000 birds, 1600 reptiles, and 8000 fishes; say 20,000 vertebrated animals. The number of invertebrates is unknown, but more than a hundred thousand exist.

Besides the obvious distribution of animals according to physical circumstances, as marine, mountain, arboreal, &c., naturalists have divided the earth's surface into six zoological kingdoms—Europe, Asia, Africa, North America, South America, and Oceania. These are again subdivided into fourteen provinces, upon the same principles as in the case of plants.

The last division of Physical Geography treats of the leading characteristics and distribution of Man. The chief distinctive types or races are commonly reckoned as four; three for the old world and one for America. An Englishman, a Chinaman, a Negro, and a Red Indian of America would fairly represent these four races. In a more regular way these races are termed *Caucasian*, *Mongolian*, *Nigritian*, and *American*. The headquarters of these races are easily laid down. The Caucasians occupy Europe, North Africa, and the south-east of Asia; the Mongolians central and eastern Asia; the Nigritians prevail in Africa, south of the great desert, and in a large number of Indian and Pacific islands; the Americans range over a large proportion of the two continents of America. Some exceptions to this distribution must be looked for, and the effect of colonisation taken into account. Thus, there has been a large overflow of the Caucasian branch into America, South Africa, Australia, and New Zealand. There are also traces of Mongolians in Europe, as Turks, Laps, and Hungarians. There is also a considerable negro element in America through the action of the slave trade. We may easily sum up the chief agencies in effecting the dispersion of man over the globe. War, commerce, colonisation, and slavery have done the work in the course of ages. It is, on the other hand, very difficult to account for the differences in colour and other physical features. Heat, cold, moisture, and the occupations of life are no doubt among the influences at work. Then there is the reflex action of national habits, or the prevailing manners and customs, coming into play. The differences, however, are so deeply seated in mental and moral matters that it is hardly possible to rest satisfied with these as sufficient causes.

Political Geography is the study of the world from the human point of view—a world of states, towns, governments, laws, commerce, and all arrangements or organisations due to man. The leading divisions have already been pointed out. From their nature they form an introduction to the deepest problems associated with the past, present, and future of the human race. The first work for the student is to secure an acquaintance with the *distribution* of states, including a knowledge of their position, size, subdivisions, and towns; and, next, to study the *organisation* of states, embracing such matters as government, industry, commerce, military and naval condition, religious system, manners and customs; in short, all such matters as contribute to the maintenance of a community as a whole. It must be clear at once that from the vastness of this division little beyond a modest acquaintance with it can be gained in anything less than a life-time. Only short and imperfect summaries of such facts can be given in an ordinary geographical work. They are useful as far as they go, especially in relieving somewhat the discussion of dry statistics, but the greater portion of the division that treats of organisation must be reserved for riper years. The chief work, then, within the reach of the student, in political geography will be in the first portion, or the distribution of states. Of these states there are about fifty in the world of considerable importance, sixteen of which are to be found in Europe. The best way to gain a knowledge of the form, relative position, and comparative size of these states is to make outline maps, both of a continent containing the states as well as each state separately. The student must copy in the first instance, but for the practical work of getting hold of this kind of knowledge nothing less than outlines from memory will do. They may be a little rough; that is a small matter. By constant practice the memory will be immensely strengthened, and a knowledge of the three important features of form, size, and position secured. Divisions, as departments, may be worked at in the same way. Too much should not be attempted in this direction. The larger divisions or provinces ought to be regarded as sufficient, except in special cases, such as the study of our own country. Towns should next be introduced. A little careful observation will make such work more intellectual. For instance, many towns are on rivers, others on coasts, and but few in other positions. The student has to guard against a common tendency in geography to work in an unintellectual or mechanical fashion. Again, laborious students overdo their map-making through introducing too many towns. In such cases a judicious selection should be made, and towns of a certain standing only admitted. It is perfectly monstrous to put hundreds of petty places in a map. It is a waste of time, and naturally tends to encourage a bad method of working, as well as disgust for a study which is thus made to consist in endless petty details. The same remark applies to other features of maps—there may be too many rivers, bays, mountains, and peninsulas. Where maps are made from memory, such faults are not so likely to occur. They are met with in the artificial elaborate performances where niceties of drawing are more considered than the facts of geography. Let the student aim, then, not at producing a beautiful copy of a lithographed map, but rather to exercise her judgment and memory in mastering the leading facts of an inexhaustible subject. Of course, every care should be taken to avoid slovenly work. In avoiding one extreme there is no necessity to run into another.

In addition to the relative size of states, there is the question of their absolute size, or square miles of area. In dealing with facts in the form of figures, mention has already been made of the necessity of comparison, and the remarks made with respect to mountain heights apply to areas and populations of states and cities. Countries may be compared with Great Britain, and diagrams drawn to show differences. Let the student note that even remembering a large number is not the same thing as understanding it, and that all facts represented by large numbers, whether in geography or anything else, are difficult and must be dealt with accordingly.

The organization of communities, though dealt with in ordinary geography to a certain extent, requires books of travel to fill up details and give us life-like pictures of the people, who in school work are but little better than abstractions. England has so many interests in the affairs of all the world, through her vast and widely-spread dependencies, and her commercial relations, that she takes the lead in furnishing the world with adventurous travellers and descriptions of far-off countries. There is consequently no lack of books to supplement the labours of early life with more interesting details. The newspaper too gives us daily lessons in this subject. From an eruption of Vesuvius to a new German Emperor nothing comes amiss, for we are all more or less interested in knowing what goes on. "The world is with us more and more" may be understood in more ways than one, for, steamships, railways, postal systems and electric telegraphs are all bringing the great human family into closer contact. There is need, then, for knowledge of the world. Human interests and speculations are now so widened, that all branches of learning tend to deal with the world as a whole. The great question of man and his history can only be considered fairly when looked at in this large sense. The present condition of humanity suggests grave problems. What was the condition of primitive man? How can we account for the diversity in human kind? Human beings are found in all parts of the earth, and must harmonize with their natural surroundings or perish. The varied features of the earth then, contribute to mould man into such forms as we find him, for, the free mountaineer, the restless nomad, the prosperous agriculturist, the hardy fisherman, are all products of circumstances. Even language, religious systems, and fine arts are influenced by causes traceable to the natural features of the earth. The history of civilisation indeed must begin by taking into account geographical agency as primary and fundamental. There is every reason, then, to encourage application to a subject so full of interest and profit, especially when the work is thoughtful and well directed.

GENERAL SCIENCE.

NATURE AND VALUE OF SCIENTIFIC KNOWLEDGE.—ASTRONOMY, GEOLOGY, BOTANY, ZOOLOGY, HUMAN PHYSIOLOGY, PHYSICS, CHYMISTRY, AND POLITICAL ECONOMY CONSIDERED.

In reviewing some subjects we see at once that there need be no question of their usefulness. This value being admitted, the student has chiefly to consider such points as are involved in bringing time and labour to bear upon their acquisition. The question of degree, however, may arise even in these. That is to say History, Geography, Modern Languages, Arithmetic, and others have no fixed standard to be reached. They are admittedly useful, but their relative importance in education is dependent upon a variety of circumstances. Personal tastes, fashion, caprice, and prejudice are all influential in turn, and as they prescribe, so a branch is encouraged as important or neglected as of no account. In one school, History is petted, in another Geography, whilst some establishments seem to act on the assumption that Music, Drawing, and Dancing should constitute the chief aim of the modern school girl. Without attempting at this point to adjust such different views upon subjects admittedly entitled to form branches of a modern education, we may indicate them as showing the difficulty likely to arise in dealing with subjects somewhat outside the usual range. What is to be said when general science is in question? Are girls to learn anything of Astronomy, Geology, Botany, Zoology, Physics, and Chemistry? There are very few people who would not be prepared to offer an opinion of some sort upon such a question. It is scarcely necessary to add that opinions based on nothing better than fancy or prejudice can afford no satisfactory answer. The subject is important enough to merit examination. A sneer at the "*ologies*" will not help us. The teacher and the student are both interested in the matter. No doubt there was a time when Astronomy was little more than twirling a pair of globes. Zoology was then chiefly a matter of shells; and a girl's artistic ideas were developed by worsted work or painting on rice paper. This ridiculous side of education is, let us all hope, a thing of the past.

Dispensing for a moment with scientific words, the question assumes a more intelligible aspect when it is put in this way:—ought girls to learn anything about the heavenly bodies, animals, plants, the properties of matter, and generally the laws of the world they live in? Analyse this question and it is resolved into two parts—(1) Are such things of value to a woman? (2) Can they, or a proportion of them, be effectively taken up in school work? Perhaps the best way to deal with the question is to briefly consider the subjects themselves. What can be made of ASTRONOMY for instance? There is surely a good deal that may be made available even in this difficult branch. The *history* of the science, pregnant as it is with the most interesting illustrations of man's triumph over difficulties, is highly valuable in itself. From the sun god of ancient days to the revelations of the spectrum analysis there is a long record of illustrious workers. Men like Thales, Hipparchus, Copernicus, Kepler, Galileo, Newton, the Herschels, and others, are worth knowing. It exalts our notions of man and his attributes to contemplate the labours of such men. Again, the descriptive features of Astronomy are comparatively easy. The facts present difficulties on account of their hugeness, but the very attempt to grasp enormous magnitudes and distances has a wholesome effect upon the mind. It is something to turn the imagination in such a direction; and the constant effort to rise to the sublimity of a theme like astronomy must tend to create a corresponding power of grasping large things, in addition to the elevated tone the study encourages. There is every reason to expect valuable results of this kind when the subject is treated in a thoughtful manner.

Physical Astronomy presents difficulties of another kind, but it is not impossible for ordinary people to learn something of the laws which regulate the working of the solar system. The laws of Kepler and Newton, such phenomena as the seasons, and eclipses, the apparent movements of the stars, the construction and use of a telescope, the system of measuring distances, and even the principle of the spectroscope in determining the constitution of some of the heavenly bodies may all be brought within the range of an ordinary student's work. It is true all this does not make a person scientific exactly. But as the object proposed is to create an interest in grand things, and to develope mental powers large, thoughtful, and elevated, there is no necessity to insist upon the young student being an astronomer. It is surely sufficient that there are gains of a valuable kind forming an ample reward for the labour expended, and which could not be obtained in any other direction, for, however valuable other branches of study may be, astronomy may justly claim to be placed at the head of all subjects that deal with matter and its organization.

Is GEOLOGY a suitable and attainable subject for girls?—Though we may admit that there are difficult problems and doubtful speculations associated with this science, we cannot deny it a high place among studies for the young. There can be no disadvantage in learning as much as possible of the actual condition of the globe, and the nature of the operations by which the different features of the earth's crust have been produced. There is something very fascinating in a subject which attempts to deal with the earth's history as a mighty mass of matter. The stones of the earth have histories, and bear the impress of bygone ages. A water-worn pebble, an ice-transported boulder, a piece of chalk, a lump of coal, speak loudly of an ever-changing past. Every hill, valley, stream, and gravel-bed, for that matter, has a history. All kinds of agencies are busy—fire, water, ice, air, frost, plants, and animals, play their parts in working out the earth's destiny. Let the student take heart, then, and welcome lessons fraught with so much calculated to excite interest and thoughtfulness. There is no necessity to shrink from the noble teachings of geology because there are unsolved problems in it. It is conceivable that man may at times contemplate with something like pride the results of his labours in this and other sciences, but the magnitude and beauty of Nature's works are more likely to evoke in him a sense of his own littleness. If we want to know how insignificant we are, let us look at the heavens; how brief a human life is, let us contemplate the countless ages of the earth's past. Indeed, it is not usually our astronomers and geologists that are puffed up with pride; they have too many wholesome lessons to be in danger of that. Narrow-minded people, prejudiced against subjects they know nothing of, are usually fond of talking of man's presumption, and are infinitely more likely to cherish a ridiculous pride of their own. It is not necessary, however, to insist upon the value of geology, or its fitness for educational purposes, and it may be well here to point out the range of the subject. Broadly speaking, geology treats of the earth's history and constitution, and the chief parts will be—

I. Rocks, their character and distribution.

2. Fossils, or remains of ancient plants and animals.
3. Agents in producing changes in the earth's condition.

Rocks.—The special study of rocks is called Mineralogy, and from its extent may be regarded as a science of itself. There are more than five hundred species of rocks known, distinguished by their hardness, colour, specific gravity, and constitution. Besides the purely mineralogical view, there is the geologist's classification of rocks according to their origin, first into stratified or aqueous rocks, and second unstratified or igneous rocks. Rocks in layers or strata are principally limestones, sandstones, clays, and coal. Igneous rocks include many kinds, granite being the chief. The principal mountains are made of igneous rocks, the hills and plains more usually of aqueous rocks, sometimes thousands of feet in thickness. Stratified rocks, again, are classified according to their supposed age, in a comparative sense, that is. Altogether, there is a large amount of work in this division, and much remains to be done by geologists before a complete knowledge has been acquired of the distribution of the various rocks forming the earth's crust, and of the metals they contain. Of England and various other countries maps and sections are constructed showing this distribution, but it is necessarily a work of time to explore the whole world.

Fossils.—In this division the ancient world of life is investigated. As we naturally take it for granted that the present races of animals and plants represent all that the world has produced, we are proportionately impressed by the facts of geology showing, as they do, that many thousands of species have utterly died out since the original introduction of life. In addition to the remains of large quadrupeds, birds, reptiles, and fishes—many remarkably unlike living species—there are stupendous accumulations of minute organisms. To such an extent do these exist that large portions of the present land of the world are composed of their remains. The well known substance called chalk, which extends over whole counties in England, and generally from the north of Ireland to the Crimea, a distance of 1300 miles, and from the south of Sweden to Bordeaux, about 900 miles, is composed almost entirely of very minute shells. These accumulated at the bottom of deep seas as they fell, and became more or less consolidated into beds or strata, sometimes a thousand feet thick. Many other limestone rocks are principally composed of shells, or are the work of coral animals. When, too, we hear of such animals in England as gigantic lizards, twenty-four feet long, elephants, hyænas, rhinoceroses, hippopotamuses, bears, reindeer, &c., our surprise is very likely to create an intellectual interest in the world, both past and present, calculated to be of service in enlarging our views of Nature's operations in time and space. Similar elements of interest are associated with ancient plants. Coal owes its origin to stupendous accumulations of vegetable matter, such as tree-ferns, reeds, conifers, club-mosses, palms, and many others. In England we now dig up a hundred and twenty million tons of coal annually—more than two hundred tons every minute. There are fields of coal in many other regions also—in Belgium, Russia, India, China, North America, the Arctic regions, and elsewhere. These seams of coal vary in thickness from a few inches to many feet, and are separated from each other by layers or beds of clay, sandstone, or limestones. Each seam of coal is supposed to represent an ancient forest, and as we have in some parts of England between seventy and eighty seams, one below another, we may well contemplate with wonder the vastness of a work like this. Each forest has been submerged in turn and covered with the sand or mud that now lies above it. The land must have risen and sunk on every occasion. Geology has wonders like these to deal with, and the most thoughtless person must have his curiosity excited when he hears of them.

Agents.—Finally, geologists treat the earth historically, and endeavour to account for the origin of the earth's crust. We see that coal and chalk have a history; so, too, for that matter, has every feature of the earth. By watching Nature's operations now, something is learned of the past. Shells are accumulating at the bottom of the present oceans to form new strata, just as they did formerly. Earthquakes and volcanoes are busy almost every day in some part. In one place the land is rising, as the north-west of Russia, in another sinking, as parts of Greenland. Lakes are filling up, coasts are wearing away, valleys deepening, mountains crumbling into ruin—nothing stands still. Even climates change. Melville Island, in the north polar regions, has produced a luxuriant vegetation, as is shown by the coal found there. England has once been something like Greenland, and long before that produced forests more or less tropical. The glaciers of the Alps are diminishing; long, long ago they extended to Turin. What a wonderful world, then, it is! Changing ever, working out its destiny to that unknown future, in the contemplation of which man feels as helpless as in the presence of the millions of heavenly bodies that crowd the universe.

All this work is carried on by natural agencies. *Heat* fuses some rocks, hardens and consolidates others. The *atmosphere* disintegrates and crumbles cliffs and mountains into dust, whilst *rain* and *rivers* wash away the fragments which form gravel, sand, or mud, according to the size of the particles. The *ocean* batters down coasts. *Ice* converts the old materials into new land. *Plants* leave their remains behind to form peat and coal. *Animals*, too, build up new lands by simple accumulation of shells, or by their growth as coral rocks. Thus, an old world is ever renewing itself, and everywhere destruction is the herald of reproduction.

BOTANY.—It is scarcely necessary, perhaps, to insist upon the value of botany as a subject of study. Most people feel the charm of plants, but it occasionally happens that some are repelled by the scientific treatment of the subject. This is not astonishing when a student takes in hand an ordinary book and looks at plants through a maze of technicalities. A beginner may well be dismayed when she finds that a common primrose is described as "a perennial acaulescent herb with simple radical leaves and pale sulphur-yellow flowers on slender scapes," and these said simple leaves are "radical, tufted, obovate, oblong, or oblanceolate, toothed, rugose, slightly pubescent, nearly sessile, exstipulate." Pretty well this, for simple leaves, thinks the beginner, and possibly hurries to the conclusion that, whatever plants may be, botany is a very dry business. Such technicalities as these, however, are the last requirements of botanists in drawing distinctions, and beginners must not suppose they are expected to digest hard words in this wholesale way. How is this subject, then, to be approached? In the first place, young people should observe the plants around them as much as possible, and learn their common names. Wild flowers in woods and fields, and the ordinary trees and shrubs of the country should be their first acquaintances. It is a very serious evil when people grow up and cannot distinguish wheat from barley, oaks from elms, or growing potatoes from turnips. Where there is total ignorance of plants, and it is common enough, a world of beauty and interest is nearly, if not quite, inaccessible. But when observation has been encouraged and a certain amount of practical knowledge acquired, as well as some facility in seeing distinctions, a more systematic piece of work may be attempted with advantage; and if botanical terms are taken up when wanted, and as representatives of something noted in plants, they will be welcomed as friends because of their usefulness.

The divisions of botany are—1. *Organography*, which treats of the structure, that is, the different parts of plants, ranging from the elementary part cell to the more complex organs called flowers and plants. 2. *Physiological Botany* discusses the functions of the various organs. 3. *Systematic Botany* considers the relationship of plants to each other, and groups them accordingly. 4. *Geographical Botany* treats of the laws which affect plant distribution over the earth's surface. 5. *Fossil Botany* includes all questions relating to plants found buried in the strata of the globe. Ordinary botany may be considered to include the first three divisions only, and these may be arranged under two heads, structure and classification.

In studying this subject the student will do well to bear in mind that the order of things is this—First, general observation of plants at all times, not only of flowers but all parts of plants; second, a more methodical study of structural features. Roots should be compared with roots, leaves with leaves, flowers with flowers, and so on. Books and teachers can assist by pointing out distinctions, but the student will make no real progress without constant practical observation. To assist the memory by promoting close and accurate observation, drawings should be made of plant organs, especially of the flower. The third stage brings into play the knowledge of structural features for the work of classification, and the nice distinctions between species and species may be noted.

The most ordinary cause of failure in studying plants is due to neglect of structure, and when the identification of species is attempted at too early a stage, success is impossible. Something more than a desire to know the names of plants should animate a student. Every plant is a living thing fitted for playing a part. Beauty of organisation is a harder thing to see than beauty of colour, but it is to be seen, nevertheless. A person may know a daisy as *Bellis perennis*, but that amounts to little. It may be mere mechanical knowledge and involve neither observation nor knowledge of plant organisation. Let us repeat, the right way to study this subject is to practise observation incessantly, and add technical knowledge by degrees. Two books, a manual of Botany and a Flora are necessary as companions, and after a certain amount of help to begin with, the student may go on her way with hope of success. Examine the common native plants first—the trees, shrubs, and weeds of the country round. Every country walk will have its pleasures multiplied. Familiar plants are attractive because they are old friends, and a new plant is interesting because it is a fresh acquaintance. Beyond all this there is the cultivated observation, alive to Nature's never-wearying beauty, and the sweet, wholesome influence shed upon minds, which with every recurring season will grow more completely into sympathy with plants and plant life.

ZOOLOGY.—In these days there is an increasing interest in animals, and not without reason, when we consider the position they occupy in the world. Their physical organisation approaches that of man, and their mental gifts are often considerable enough to excite his astonishment. Animals, too, subserve so many uses in their relation to man's wants that his attention must be drawn to their distribution and habits. The question here, however, is the nature of zoology and its value as a study. We may say that the great world of animals is now pretty well exposed to view. For, as the world has been explored in nearly all directions, such groups as mammals, birds, fishes, and reptiles are not likely to be materially affected by many new discoveries. The microscope has revealed the existence of thousands of minute organisms, and consequently enlarged our view of animals as a whole, and made a general classification based in their organisation possible. The divisions of this subject are necessarily similar to those of plants, and may be termed Geographical, Structural, Physiological, Systematic, and Fossil respectively.

The habit of observation should be encouraged to begin with. Our own personal experience can be supplemented largely by the help of various collections in aquaria and elsewhere; books will come into use, too, partly to teach us what to look for, and partly to describe such animals as are inaccessible. All this lays a foundation for closer examination and the study of organisation. This naturally prepares the way for classification, and only by some familiarity with the principal groups can an adequate conception of the marvellous extent and variety of the animal kingdom be acquired.

After all the student naturally asks for the advantages to be pointed out. Is there anything to be gained beyond the pleasurable interest arising from observation of animals and their ways? That is, as regards ordinary people, who are not scientific, and who are concerned, not with a special study of a subject, but rather with the large question of their own culture. From this point of view the answer is, that we gain in various ways. There is, first, an increased knowledge and interest in a most important part of that great whole called the globe. There is next the negative advantage of avoiding ridiculous errors, and even superstitions in connection with animals. It is something to get rid of all fear of the raven's hoarse cry, the howling of dogs, and the ticking of the death watch. Lastly, there is the comparative elevation of our own nature—a kindlier feeling amounting to a better sense of justice towards animals. We are more likely to recognise what we may call the rights of animals as we know more of them and their ways. Not only will animals gain by this, but man's better nature will be encouraged. He will learn to look upon his position as lord of creation as a responsible one; and regard it as particularly mean, as well as injurious to his own nature to ill-treat animals. In this direction the gentle influence of woman may be exercised with advantage; and as we have got rid of bull-baiting, cock fighting, and similar amusements, we may hope some day to see the humane feelings of the community successfully oppose some existing practices which are hardly less cruel and demoralizing.

HUMAN PHYSIOLOGY.—From the contemplation of animals to the study of human organization is but a step. Much stress is now laid upon the value of self-knowledge in this respect, leading, as it does, to a better appreciation of hygiene, or the laws of health. It is quite possible for ordinary people to understand the value of good air, pure water, unadulterated and properly prepared food, abundant exercise, or the evil consequences of dirt, infection, indolent habits, and intemperance. Much attention has been given to such matters of late, and as women have so much to do with the management of a house, or what might be called domestic economy, their education in this direction is desirable. Thousands of little children perish annually through mismanagement. Health is undermined, and life shortened in all directions through ignorance and consequent neglect of nature's laws. Hurtful fashions illustrate this most forcibly. It is bad enough when fashion runs counter to every principle of good taste, but when the laws of health are also set at defiance, worse results follow than a temporary reign of ugliness. When the peril of such courses is fully understood, there will be proportionate respect for all that tends to preserve health and prolong life.

Physics.—The laws termed physical in the strict sense are so universal that no human being can live in the world without constant intercourse with them. Consequently we all grow up with a practical acquaintance with numberless physical facts, such as the ordinary properties of matter, that is, whether substances are light or heavy, solid, liquid or gaseous, transparent or otherwise. We know from experience that objects fall downwards, that water wets, runs down hill, freezes through cold, and so on. Familiarity with these things does not, however, give us accurate knowledge of them. Take such a case as weight. Most people would take it for granted that experience of the ordinary sort would enable them to decide upon the comparative weight or specific gravity of well known substances. This is not so. Let any student unfamiliar with physics test herself with this list of substances, white marble, silver, iron, quicksilver, glass, lead, and tin, and pick out the heaviest or lightest. Our experience is at fault because we are familiar with some substances in larger masses than others. Thus few people know that silver is almost as heavy as lead. We may see from this that we are hardly likely to understand the phenomena that depend upon light, heat, electricity, and sound. Nothing can be more common than manifestations of forces like these, and ignorance in this direction seems to be ignorance indeed. That an otherwise well educated person should see herself in a mirror and have no idea why, should play a piano every day and know nothing of sound, fall down at a skating rink and overlook the law of attraction, is not only possible but inevitable without study of Physics. To such a person there are unfathomable mysteries in spectacles, magic lanterns, thunder and lightning, springs, fountains, dew, and electric telegraphs. Such ignorance is as unnecessary as it is undesirable, for although a foundation only can be laid at school, it is good to encourage discussion of such matters, and go as far as circumstances permit. To understand such things thoroughly is possible to but few, but the world need not be divided into those who know all and those who know nothing. In a former work the author has pointed out the value of physical science in its larger aspects, especially in discouraging superstition, and surrounding man with practical applications that tend to promote a higher type of civilization.

CHEMISTRY.—It is not necessary to insist upon the educational value of Chemistry so far as it can be dealt with. A science that explains the nature of air, water, and food, such phenomena as combustion, rusting, fermentation and decomposition, as well as innumerable processes in industrial art, must be worth every hour that can be spared for it. Chemistry forms the complementary study to physiology, and some laws of health cannot be understood without it.

POLITICAL ECONOMY.—It may be convenient at this point to say a word upon Political Economy, or the science of Economics. In addition to such large questions as the laws which affect national interests, there are many lessons in this subject calculated to encourage sound views upon matters of expenditure. It is something to understand the baneful consequences of extravagance, and to learn the useful lesson that all waste is wrong. It is difficult to convince people that the extravagance they find so pleasant is not to be justified on the ground that it is good for trade. An immense amount of misery is caused by thriftless habits and slovenly notions at the bottom of them. Political Economy is sometimes charged with being harsh in its maxims, as when it discourages indiscriminate almsgiving. It is pleasanter to give a beggar a trifle and pass on with a sense of having done something creditable, than to deny oneself such a cheaply purchased gratification; but there is another side to the question. How many sturdy beggars have been encouraged in laziness by such practices? How many otherwise industrious and respectable members of the community have lost all self respect, and sunk into the degraded condition of professional paupers? The lessons of Political Economy are a wholesome check upon impulses more or less ill regulated. They point the way to success in the management of our affairs by showing that things ought to be put to right uses. True economy is indeed the art of making the best of things as regulated by intelligible principles. In some cases it shows that a generous outlay is true economy. This is a totally distinct thing from the miser's view of thrift. "*Use, but do not abuse,*" should be a sensible person's rule. Make good use of your time or money. This does not mean that you are to always use time for working only, and put every shilling in a strong box. Time is sometimes profitably employed in recreation, and money may be advantageously expended in one's education for instance, in promoting health and strength, in assisting the helpless, and many other ways.

The question of expenditure is fraught with important consequences of a less direct nature. People are constantly striving to rival each other in dress, houses, equipages, and so on, from some feeling that their position requires them to do so. Hence, we constantly hear of well-to-do people dying and leaving their families pennyless. Here is a fine field for the exercise of woman's influence. A house is in a great degree dependent upon her for the scale on which it is organised, and it is high time that ostentatious expenditure should be distinguished from refinement. It is not only not refinement, but mere vulgarity to make a display of wealth for the sake of outshining others. In a rich country like England there is a growing tendency to worship wealth in this vulgar form and to admit its claims to stand in the place of culture and refinement. Let, then, the student who wishes to play a useful part in life discourage the idea that money compensates for all shortcomings, that there is a certain dash in spending recklessly, and that it is mean and poor spirited to consider what is best instead of what is pleasantest.

ARITHMETIC.

DIFFICULTIES OF ARITHMETIC.—ENGLISH AND FRENCH WEIGHTS AND MEASURES CONTRASTED.—SUGGESTIONS TO STUDENTS.—VALUE OF ARITHMETIC, DIRECT AND INDIRECT.

ARITHMETIC is not always a favourite study with girls. This is probably owing partly to its exacting nature, and partly to a feeling that a woman has no particular need of anything beyond a limited acquaintance with it. Let us examine these points a little. The difficulty found in the study of arithmetic is not entirely due to the nature of numbers; something of it is caused by our money system and complicated weights and measures. It is tedious in a high degree to commit to memory the multiplication table, money tables, and the perplexing subdivisions of weights and measures which seem especially created to torment young students. A draper divides his yard into quarters and nails, a builder into feet and inches. Corn is associated with pecks and bushels, wine with pipes and gallons, and as for weights, the grocer divides a pound one way, the bullionist another, and the druggist a different way still. Not only are the subdivisions utterly without system, but some terms are misleading; thus a hundredweight is really a hundred and twelve pounds; a quarter of corn is not a fourth part of a load, but a fifth. Again, a truss of old hay is fifty-six pounds, a truss of new, sixty, and a truss of straw thirty-six pounds. Now, arithmetic is not responsible for these eccentricities. They are the results of business transactions in many trades during centuries in innumerable localities, and the difficulty of getting rid of them and adopting a new system seems to be insuperable. Sanguine people suggest an Act of Parliament for a systematic arrangement of our weights and measures, and it is possible that an improvement may be made some day. In the meantime, students must face the difficulties gratuitously bestowed upon their arithmetical studies with the best grace they can.

The difficulties of English weights and measures are perhaps all the more annoying as the French possess a system which anybody may master in a few minutes. Thus, the unit of measure of length is the *mètre* obtained by taking the fourth part of a terrestrial meridian and dividing it into ten million parts. This *mètre* is nearly 39⅓ inches of our measure. As a decimal system of multiples and subdivisions is employed we get *décamètre*, or ten mètres; *hectomètre*, or hundred mètres; and *kilomètre*, or a thousand. For subdivisions Latin prefixes are used, and so we have *decimètre*, the tenth part of a mètre; *centimètre*, the hundredth part; and *millimètre*, the thousandth part. The unit for cubic measure is got by taking a vessel—measuring a décimètre every way. This is called a *litre*, and is not quite equal to an English quart. Prefixes similar to those already mentioned are used for multiples and subdivisions, as *décalitre* or *décilitre*, and so on. For weight, a litre of distilled water at its greatest density is called a *kilogramme*, that is, a thousand grammes. Taking the *gramme* as the unit, we use the Greek and Latin prefixes as in the other cases. The simplification of arithmetical operations, in consequence, is enormous. In a case in proportion where we have to deal with such a quantity as 5 tons, 7 cwt. 9 lbs. 3 oz., the whole must be reduced to ounces, involving labour and a knowledge of the table. A similar case in French—5, 7, 9, 3, might be, let us say, five kilogrammes, seven hectogrammes, nine décagrammes and three grammes. These can be taken as five thousand seven hundred and ninety-three grammes if required, or five hundred and seventy-nine décagrammes three grammes, or in any other combination. When we contrast this with the work to be done in connection with our tables we can see how much is gained by a system which virtually dispenses with tables of weights and measures.

As a natural consequence of the drudgery required to commit tables to memory, students are sometimes tempted to get through their arithmetic by the help of a book of tables at hand. This may secure relief for the moment, but it is a very bad practice, since it adds to a student's difficulties by distracting her attention from the essential parts of the operation, and, in addition, disgust for arithmetic is certain to be the result of constantly referring to tables. The only advice that can be given to the student upon this point is to learn the principal tables thoroughly, as being infinitely the shortest course in the end. Every calculation can then be carried on with the attention concentrated in the working; every operation will be associated with every other one without the break caused by stopping to find out how many yards make a mile, and so on. The co-relation of all the processes being much more apparent, a firmer grasp of the work is obtained, and the interest in it increased.

The practice of counting the fingers is mischievous, as it substitutes a slow and mechanical operation for the infinitely more rapid and intellectual action of the mind. In reality, too, mistakes are more frequent, for it is not slow and sure in this case, but slow and uncertain.

Another little matter which will facilitate progress in this study is care in forming figures, so that seven is not mistaken for four, three for five, noughts for sixes, and so on. The eye counts for much in such things, and errors are avoided or corrected with more certainty when the figures are sufficiently large and distinct. It is a good plan to use slates in preference to paper for all practice in arithmetic, as mistakes on paper tend to confuse the operations.

To ensure success in this subject it is necessary to cultivate the habit of regarding the numbers, whether abstract or concrete, as something more than figures. The mind ought to be encouraged to attach significance to such things. This matter has been touched upon before, and it is not, therefore, necessary to enlarge upon it again.

Another important point is a thorough knowledge of the Arabic system of notation. The student, of course, should be able to read any row of figures, or write down any given number properly. The superiority of the Arabic system of numbers lies in the principle of assigning different values to a figure according to its position. Thus, 1 will always stand for one; but one what? As numbers are infinite, one may stand for countless billions, or, at the other end of the scale, for billions less than unity, according to the place it occupies. The other figures have the same elasticity; 2 always stands for two, as two simply, that is, two units, two tens, two hundreds, and so on. So, by means of nine figures and the cypher, any conceivable number above or below unity can be written down.

There is no doubt that students often experience difficulty in dealing with the principles of arithmetic through their imperfect acquaintance with the Arabic notation. Without it, the practice in the operation of addition of carrying some figures to the following line is unintelligible. Borrowing in subtraction, and multiplying by carrying the product of each succeeding figure one place to the left, and many other operations, are dependent upon the system being what it is.

Among the obstacles to progress in arithmetic must be included the indifference and dislike of students themselves to a subject that exacts special care and patience on their part. Young people are rarely endowed with such qualities as attention, patience, method, thoughtfulness, and perseverance, and they bring them into play with difficulty. Hence the irksomeness of their tasks. It is not particularly pleasant to impatient youth to discover at the end of a long operation that a slight oversight, apparently as unimportant as the omission of a dot over the letter *i*, has produced an ugly effect upon the result, and rendered all their painstaking efforts useless. Let the student, however, observe once for all, that painstaking is never really useless, and here it will be convenient to point out how valuable a study must be, that insists upon the utmost accuracy. In many branches an approximate degree of correctness may be tolerated, and even merit praise. Not so with arithmetic. There is no room for approximations. An operation must be without flaw, or it is useless. This is a most valuable characteristic, as it necessarily tends to develope such qualities as *patience*, *attention*, *perseverance*, *method*, *neatness*, *reasoning power*, and *accuracy*. These are the factors of success, as students will find out. There can, then, be no doubt that studies like arithmetic, algebra, and the mathematical series generally, are particularly well adapted for training purposes, and this constitutes a portion of their value in education, apart from any practical purpose they may serve in the affairs of life. When a student says to herself, "I shall not want such things after I leave school; I shall have no use for fractions or algebra, and so I need not trouble myself about them," she overlooks their *training value.* In this she is not singular, since it is a common practice to take narrow views of educational matters.

Not only is the training value of arithmetic very great, but it may easily be pointed out that the *practical value* of arithmetical knowledge is likely to be larger than is commonly supposed. In addition to the direct use of arithmetic in ordinary calculations, as in buying and selling, in forecasting expenditure, managing property, and the like, the importance of which need not be insisted upon, it facilitates the acquisition of countless facts and teachings in relation to other subjects. In Geography we have statistics of areas, populations, heights, distances, revenue, expenditure, national debt, commerce, and others, which, to be really understood, demand some familiarity with numbers. Astronomy introduces numbers in speaking of the size, distances, orbits, and velocity of the heavenly bodies. The laws of Kepler and Newton cannot be discussed without constant reference to numbers. So, too, in dealing with physics, chymistry, geology, history, and other departments of learning—everywhere statistics. So much so, that we may say the methodical treatment of truth necessarily assumes relations which can only be properly represented by numbers. An isolated truth becomes of value when it is put into its place, and its relation to other truths expressed. It is all very well, for instance, to say that lead is heavy. That expresses a truth; but how heavy? The answer is, 11·352 heavier than water. Here we get definite relation, and the truth in this form is far more valuable. If we say England has a large national debt, we speak in a general way. To see the meaning we should find it necessary to consider the amount in several relations, such as—yearly revenue, number of population, comparison with other national debts, and so on. All these things demand the use of numbers. It is not necessary to multiply examples; the student will soon see that the application of arithmetic is co-extensive, or nearly so, with knowledge itself. This being so, there are the strongest reasons why the subject should have all possible attention, for the mind must deal crudely indeed with knowledge that attempts to dispense with arithmetic.

ACCOMPLISHMENTS.

REFINEMENT AND IMAGINATION.—FINE ARTS.—DRAWING AND PAINTING.—MUSIC.—NOVELS.—POETRY.—MODERN MANNERS.—PARTING WORDS.

THERE are certain subjects, standing somewhat apart from ordinary or useful acquirements, that are conveniently spoken of as *accomplishments*. Music and painting, and works of imagination in language are of this class. As the cultivation of refined tastes aims at giving a polish or finish to the ruder and more substantial work of education, the term is not inappropriate. Genuine refinement is so valuable to man or woman, that any studies calculated to encourage it deserve earnest consideration. Speaking of refinement generally, we may regard it as a mental condition in which pleasure is taken in that which appeals to the imagination rather than to animal tastes. To eat, drink, sleep, and run about are good and necessary things, but those who content themselves with the mere pleasures of sense are on the same level as many animals. Not only does refinement encourage the practice of enjoying mental feasts, it modifies habits of all kinds, and gross things become less gross. There are different ways of eating even. An Englishman soon finds that out when he visits the Continent.

Refinement in its best form encourages a certain nicety in dealing with our fellow-creatures. We shrink from hurting their feelings. Our imagination puts us as it were in their position, and we act accordingly. Refinement naturally makes cruelty to animals more difficult to practise, for a similar reason. Indeed it is easy to understand that a cultivated imagination, tending, as it does, to create a sense of the effect of our actions upon others, counteracts the primary selfishness of man's nature, fosters kindliness, and, it may be, something higher still—for a readiness to think of others, by putting ourselves in their places, enlarges our sympathies, and makes it possible to "do as we would be done by." The culture of the imagination also promotes the power of image creating, of seeing with mental vision—of looking "before and after," and it may be, "pining for what is not"—a glorious faculty, raising the thoughts to lofty heights, weaving fantasies, and filling the world with light and beauty. It may work in another way though. The imagination is fruitful in gloomy visions; life may be saddened by this image-making power, and self-torture added to the scarcely less real afflictions we must bear. When all is said, however, the faculty is one to be cherished, strengthened and regulated; for, there is the additional value already mentioned in which the character is beneficially influenced in relation to others.

We see that refinement depends largely upon the imagination; but the constant practice of gentle and gracious actions is also to be taken into account. Pleasing and refined manners are thus partly matter of habit; partly dependent upon cultivated imagination; and as the first is manner only—merely a way of doing things—the refinement that springs from within, so to speak, is the better of the two. The happiest state of things is where refinement is indebted to both habit and feeling. Habit makes it easy to carry into action, and feeling imparts that thoroughness which exalts it into a kind of virtue.

If we start with the axiom that people are not fully refined by nature, it follows from what has been said that refinement is a matter of culture. It is not within the scope of this work to discuss the question of refinement in relation to habits beyond remarking by the way how much is done by our surroundings. Children, from constant association with people of refined tastes, insensibly acquire a certain refinement of manner, and no doubt something more. It facilitates the acquisition of refinement in the nobler sense when we start with a foundation of this kind, and so far is of great value. Let it, however, be clearly understood that the real thing does not consist in refined manners alone, but in tastes and feelings more or less inherent in man, and susceptible of almost indefinite cultivation.

The special cultivation of refinement resolves itself principally into the acquisition of knowledge connected with such branches as form the fine arts. These fine arts differ from the merely industrial arts in appealing to something beyond the practical wants of our nature. Imagination forms the basis of all of them more or less. What we may call the poetry of things in a large sense is associated with them, beauty of some sort being essential. The principal fine arts are:—

Floriculture,
Jewellery,
Pottery,
Architecture,
Sculpture,
Painting and Engraving,
Music,
Fiction.

This is not a complete list. Fine art is so blended with common art that it is impossible to draw a sharp line between them. Thus, book-binding is naturally a useful or common art, but it passes into the fine art stage at times. So with furniture, textile fabrics, and others. What we are concerned with here is not, however, the whole range of a large subject, but such fine arts as are more especially prominent, or occupy a possible place in early culture. These may be particularised as *Painting*, *Music*, and the *Literature of Fiction*. Let us consider a few points connected with these arts, and see how they stand as factors in education.

PAINTING.—In painting we include drawing; and of both painting and drawing there are different styles. Whatever they may be, all painting and drawing in a certain sense may be resolved into matters of form and colour. Leaving such features aside as technical, we may more advantageously consider certain general questions. First, it should be laid down that drawing is so valuable that every student ought to practise it. The elements may be attacked even if the drawing faculty be slight. Those who have gifts that way can go further, but each can do something. Drawing, except in its higher form, is essentially a matter of imitation like writing. The humblest may cultivate hand and eye by practising drawing and painting. A better knowledge of form and colour, a developed observation, a juster appreciation of the relation of one part to another, and a nicer critical faculty in everything pictorial, will be the reward of those who have practised the art even unsuccessfully in the creative sense. To draw an object properly a person must see it properly; indeed, the best way to look at anything thoroughly is to draw it. This is an art in which even a little experience is well worth having. Let a student attempt the simplest sketch—a stone, a leaf, a post, anything—and he will learn something because he will see what he never saw before. How much too he may gain by seeing nature's works more completely—her trees, mountains, clouds, and sunsets! From a tuft of moss to the starry heavens there is range enough; and the practice of drawing is almost certain to create a higher interest in nature's pictures, and in this there is a gain indeed. To feel in sympathy with the aspects of creation is to enjoy a pleasure refined and priceless, for no money can buy it, yet it is within the reach of the poorest. It is not necessary to speak of those who possess a natural aptitude for drawing; they will enjoy higher advantages still—the power of creating works of art. They will need no word of encouragement; the art fascinates them, and their labour is a labour of love.

It is now time to consider what the student can do to promote her own success in the cultivation of so useful and beautiful an art as this. In the ordinary course of things, a beginner is set to copy drawings or parts of drawings. Up to a certain point this may be useful, but copying from drawings and nothing but that, is ruinous work. It is slavish imitation, and in itself leads to nothing except the power of making a copy. It is usually encouraged by students themselves, as mere servile imitation like this enables them to reproduce pretty looking drawings almost as good to look at as the originals. Earl Granville, in a recent address, stated that at school he was four months drawing a church with the help of the drawing master, and it looked so well that he was highly pleased with the performance. At home his father asked him to make another copy, but he was mortified to find that the task was beyond his powers. The contrast between this mode of drawing, and the first attempts at representing objects, is so great that students who have acquired some skill in copying are discouraged at the feeble results of their labours, and unless they can be convinced that drawing from objects is the only real work, they are certain to fall back upon the production of prettily coloured heads, showy landscapes and the like.

In such matters as these the teacher in many cases is hardly a free agent. He knows what is best, let us say, for his pupils, but his firmness must be above the average to oppose successfully the wishes of students and indulgent parents, to say nothing of his own tendency to slide into the bad practices which secure immediate popularity and entail less trouble. It is true that there is much less of this kind of thing than formerly. The pretty productions touched up by the drawing master, which gratified pupils and their admiring friends, and excited the ridicule of artists, have given place, in many cases, to work infinitely more meritorious, even if somewhat deficient in the attractions that would justify a handsome gilt frame and a place in the drawing-room. Let the student encourage herself to draw simple objects. The common mistake is to attempt too much at first. After copying for some years, the student plants herself before—say, a waterfall, or a farm yard, and makes a muddle of it. How can it be otherwise? The worst of this is that the student either returns to copying, or assumes that she has no talent for drawing. Should the student however take heart and be induced to draw almost anything that is simple for practice—to study little by little the principles of perspective, the optical laws of colour, shadows and reflections, her artistic powers whatever they may be, will have some opportunity of gaining a certain amount of success, sufficient in most cases to secure some of the advantages already spoken of, even though the creative power may be unattainable.

Music.—Every English lady is supposed to be musical. She must at the very least profess to like music, and any amount of it, whether proficient or not in the art. There is something so specially ethereal and refined in music that love and sympathy in that direction are naturally enough supposed to indicate a certain elevation and refinement of mind. It is possible that some people hate music or are indifferent, but few have the courage to avow such feelings. Shakspeare has denounced the man with no music in him, and the sentiment of our day agrees with this view. Any way, music enters so largely into the habits of modern social life, that it is the art of arts for woman. It has some claims to this pre-eminence. The universality of this taste for music is remarkable and significant of its intimate connection with human nature. Let us admit the value of music and consider its educational aspects.

In the first place music is vocal and instrumental, and as the gift of a good voice is given to but few, a readiness to forego ambition in the direction of solo singing should be encouraged. It is difficult to conceive the disagreeable effect produced by attempts at vocal display which, either from the inherent difficulty of the music or want of capacity in the singer, are but attempts and possibly very poor ones too. Choral singing is a different matter, and all should cultivate any power they may possess of voice or musical capacity as far as it will go. Very moderate voices may produce pleasing effects in combination, and as few people are absolutely devoid of some musical capacity, they may successfully attempt to gratify others by their performances. Even good voices are not always quite successful in giving pleasure to listeners. A great deal of culture is necessary to give complete mastery of the voice. Some singers spoil almost everything by imperfect pronunciation of the words, to the extent of suggesting doubts about the language they are employing.

Some people are too ambitious, and prefer spoiling a grand scena to singing something more within the scope of their powers. Vocal gymnastics occasionally serve to shew the command of the voice attained by assiduous practice, but they are not necessarily calculated to give the pleasure that soothing, spirit-stirring, or pathetic music can do. A sort of wonder is rather the feeling inspired; but a man on a tight rope can excite this feeling still more readily, and surely music, whether vocal or instrumental, ought not to enter into rivalry with performances that are nothing if not astonishing.

Some of the foregoing remarks apply also to instrumental music. One great disadvantage in addition that may be noted is the monotony of amateur music at social gatherings in consequence of the modern young lady's almost exclusive devotion to the pianoforte. Beyond this there is the inherent imperfection of the instrument itself. As an instrument of percussion the pianoforte is a wonderful illustration of ingenious contrivance, but it is not adapted for exhibiting in an equal degree the finer qualities of the gifted musician. Its universality is probably due to the fact that indifferent playing is more tolerable on this instrument than most others. No doubt there is room for considerable display of light and shade in playing, firmness and delicacy of touch, crisp and brilliant manipulation of the key-board; but its weakness lies in the absence of long drawn-out tones and consequent expression. The violin is infinitely its superior in the production of music that touches the heart, and it would be an improvement on the present state of things if some girls devoted themselves to this and perhaps a few other instruments. According to present fashion if there are six sisters they all play the same instrument, and that instrument the pianoforte. As a consequence of this, an enormous amount of ephemeral music is written or arranged for the piano, and too often, the tendency of modern drawing-room music is either sleepy, expressionless strum-strum, or frisky movements, in which one hand seems to be racing the other all over the key-board.

Then, again, it is a question whether every girl should as a matter of course, with or without capacity, spend from one hour to four or five a day for ten or twelve years in attaining, or trying to attain, the power of performing on the piano. When there is a genuine musical gift, let it, like all precious gifts, be turned to account; but where only ordinary powers exist, it would surely be wiser for the student to direct her energies and tastes into other and more congenial channels. It is a common practice, in a modern English drawing-room for a brisk conversation to spring up when music begins. What is this—otherwise an unpardonable rudeness—but a social protest against the infliction of so much trashy music, or good music played badly? A little less music, and of a better quality, would be an improvement. Again, students ought to be encouraged to study the principles of harmony to a greater degree than now. There are thousands who practise the fingers incessantly, and leave principles altogether on one side. The study of genuine music, whether classical or not, would help in the formation of better taste in this respect; and refinement and feeling would not be so frequently swamped in a deluge of noisy notes.

It may be said that fashion is omnipotent, and that it is useless to lay down rules which, as things go, must be disregarded. That is not so. Defects in educational as well as other matters must be seen to be defects before anything can be done. Even now there are signs of improvement, but there is still a great waste of time and labour; and woman herself must be appealed to in a matter that educationally and socially is susceptible of change for the better.

FICTION:—*Novels.*—It has already been laid down that the cultivation of the imagination is necessary, and writings in the shape of novels and romances may serve a useful purpose or otherwise according to circumstances. Romances as such are the most purely fictitious in their nature, and appear to give delight to children or people whose mental enlightenment is not sufficiently advanced to dispense with belief in ghosts, witches, magicians, fairies, giants, enchanted castles, etc. The machinery of romances is rough and striking, and it may be useful to evoke the faculty of wonder by such agents. The great drawback in such things is their tendency to perpetuate a belief in non-natural agencies, and so to intensify superstition. In modern countries, however, the genuine romance hardly exists. It is a species of literature that must disappear when the belief in the existence of ghosts and fairies has given place to a better knowledge of the world and the laws of matter.

The imagination may now be exercised in a more wholesome fashion. The modern novel has taken the place of the old romance, and is a special product of recent times. As we are impatient of supernatural machinery the novel usually dispenses with ghosts and their kind, and professes to paint pictures of society past or present. The basis of the novel, then, is different from the romance, as the actors are men and women who are supposed to represent actual men and women, and show what the world is like. Everything in a novel should be possible in actual life. The reader is cheated by his imagination into a sort of temporary belief in the existence of the characters in the novel, and is interested in their fortunes accordingly. The woes of the heroine are reflected in his own saddened feelings, her joys delight him, he mentally reprobates the wicked, and rejoices in triumphant virtue. It is curious that men and women who know something of the world should find pleasure in reading novels, but such is the fact. That young people should be interested in works that profess to give them glimpses of the unknown world of grown-up men and women is intelligible enough; the question, and it is of some importance, is, whether novels are useful reading for the young? We need not waste our time upon novels essentially vicious, let us assume that we are considering the question with reference to works not chargeable with anything noxious.

In the case of girls, indiscriminate novel reading must be attended with some danger, as they may read works unfit for perusal. The first conclusion arrived at, then, would be to keep an eye upon all novels accessible to the young. To a very large extent, however, girls are permitted to read as many novels as they like; and, as it is not easy nor very desirable perhaps to exercise rigid supervision with respect to reading novels, the best way is to put the case fairly before students themselves. Even harmless novels are open to two objections so far as the young are concerned, and which apply because they are young. In the first place novels are written to amuse, and if a strong taste for reading them is created, works of history, geography, and high class literature will seem dry and uninteresting by comparison. There is danger of a young novel reader delighting only in novels. This question of forming tastes is of great importance. Even the strongest advocate for the value of novels would surely admit not only the necessity of people reading books of another kind, but liking to read them. When such tastes have been established, this danger from novel reading vanishes.

Again, as young people—girls especially—are ignorant of the world, their opinions are likely to be injuriously affected by such views of life as novels present—for though an attempt is made to paint the actualities of life in their social, political, or historical aspects, as the case may be, in point of fact there can never be much more in novels than an approximation to the realities of human experience. The author must contrast characters, crowd his pages with incident, and work out a plan to a sufficient climax in order to secure that interest in his writings which means success. Life is usually made up very largely of small matters—constant repetitions of similar incidents. The novelist must necessarily avoid these and introduce striking and unusual scenes that *might* occur in actual life, but not in the way he presents them. In novels the good usually triumph over their difficulties, whilst the wicked are appropriately punished. In real life this is not inevitably the case. In novels each actor is endowed with certain characteristics, and is generally consistent with himself. In real life it is not only possible but common for the same person to be just and unjust by turns, to be generous and mean, in a word, to be inconsistent. In novels love and its vicissitudes predominate, and to get married and live happily ever after is a matter of course. In real life marriage is the beginning of a woman's career rather than the end, and its happiness as a state, among the uncertainties to say the least. Novels, except the cynical sort, look upon love and poverty as rather desirable than not. Real life teaches a different lesson, and would encourage prudence as a surer basis for happiness than sentimental rashness.

Beyond the general misteachings of novels, they are often bad guides in special ways. Some are cynical and sneer at every honest emotion; some are sentimental or lackadaisical; some paint exciting but coarse and vulgar scenes and characters, which may be true to nature, but pander to morbid tastes; some mystify the past and give us a mixture called an historical novel; some delight in the lispings of infants, others entertain us with a jargon supposed to be the dialect of fashionable people, in which French is put in the place of much better English, and the exquisites themselves seem all bored to death. Sometimes the sharpest controversies are carried on in novels upon religion, or, rather, dogmatic theology, and the atmosphere is charged with high church, low church, or broad church, as the case may be. Politics, too, figure in novels, and in one work tories are sensible and worthy, in another they are foolish and worse. In works of this kind there is that onesidedness which is hostile to all breadth of view, and the young and impressionable are likely to be hurtfully influenced upon all these points if they acquire their opinions and tastes from novels.

To sum up, students should dispense with indiscriminate novel reading as much as possible. When life has given them experience of the world, and reading has created a taste for high-class literature, when good principles are established, and valuable habits contracted, the case is different. Novels then may serve to charm and brighten life. The world of the novel will be distinct from the world of experience, and the pleasure afforded by such works will not be purchased too dearly.

POETRY.—The objections to the modern novel do not apply to poetry or romances like the Arabian Nights. In such works we are not exposed to the illusions of works that affect to portray realities. The metrical character of poetry, the elaborate and ornate diction, the lofty tone, are all indications of a world of imagination, and the youngest reader is conscious that the real world and the world of poets are two different things.

It may be laid down that Poetic Literature is valuable for—

a.—Extending our knowledge of language as a vehicle of expression.
b.—Improving pronunciation by calling attention to distinction of rhyme, accent, and quantity.
c.—Promoting observation of the beauty of Nature's works.
d.—Cultivating a refined imagination.
e.—Heightening our appreciation of the finer attributes of humanity.

a.—Reading poetry tends to enlarge our vocabulary and knowledge of phrases. Poets employ words which are partly or wholly obsolete in prose diction. Phrases are introduced which aim at giving precision, force, elegance, and picturesqueness to thought, and many of these pass current and enlarge the capacity of the language for expression. Such compounds as storm-swift, many-fountained, league-long, and the like, arise from the poet's desire to use picturesque epithets.

b.—Reading poetry aloud directs attention to pronunciation. There are careless people who would pronounce the last syllable of horror like the last of morrow. Indeed the pronunciation of unaccented syllables is often very defective even among the educated. Poetry exacts more care in this respect than prose, and the natural result of reading it aloud would be a more cultivated ear for rhymes, and a more accurate pronunciation, closer attention to unaccented syllables, and a due appreciation of long vowels and their value in giving a musical character to language.

c.—As poets delight in the beauties of Nature—

> "The fields, the lakes, the forests, and the streams,
> Ocean, and all the living things that dwell
> Within the dædal earth, lightning and rain,
> Earthquake and fiery flood and hurricane"—

a reader of poetry is likely to develope observation for such things, to feel their charm, and acquire a pleasurable interest in the contemplation of Nature.

d.—Poets encourage the imagination by constantly demanding its exercise on the part of readers. In certain kinds of poetry the range is beyond the objective or the limits of human experience, and to follow we must rise if possible to the height of the thought.

> "The everlasting universe of Things
> Flows through the Mind, and rolls its rapid waves,
> Now dark—now glittering—now reflecting gloom—
> Now lending splendour, where from secret springs
> The source of human thought its tribute brings
> Of waters,—"

e.—Again, too, poetry shows in a striking degree how much there is in man's nature of elevation, of splendid perception, and that glorious instinct for the beautiful which is amongst his most valuable gifts. Language and thought acquire sweetness, dignity, and beauty unattainable except by poets. Of men with gifts like Spenser, Shakspeare, Milton, Wordsworth, Byron, or Shelley, there must always be few indeed, but they are numerous enough to prove the existence in man of godlike faculties, and, being far above the crowd, they establish high ideals, stimulate noble emulation, and light up the dim world for millions who possess dull and aimless imaginations.

The student must not expect to enjoy the advantages of poetry without careful cultivation. Poetry is not immediately accessible to the young, or, indeed, to any one else. Much mischief is done by reading difficult poetry before the mind is prepared to appreciate it, and distaste is created for an author in consequence. To ensure success in establishing a genuine love for literature of this class, the following notes for the student may be found useful:—

1. The young should read poetry that is simple in language and interesting in subject, and generally within the range of their knowledge and imaginative powers. Thus Scott's Narrative Poems can be appreciated long before the mind can understand and enjoy "Lycidas" or "In Memoriam."

2.—Modern Poetry, that is of the present century, should be read before that of previous periods: partly because the language is more like our own, and partly because it reflects the light of modern thought and harmonizes more with modern sympathies. The poetry of a bygone period is necessarily in some degree outside the range of both.

3.—Poetry should be read with the greatest care —a little at a time thoughtfully and slowly. To run through "Paradise Lost" as if it were a flimsy three-volumed novel is preposterous. It is also a useful practice to commit to memory fine lines and passages.

4.—Poetry should be read aloud or sung. The full beauty of rhyme, alliteration, rhythm, and melodious expression can only be duly appreciated when the ear is appealed to. Poems no doubt are often enjoyable when read by the eye alone, but the human voice must be brought in to do them full justice.

5.—Lastly, the student should bring to the reading of poetry a sufficient knowledge of rhymes, metres, figures of speech, and the mechanism of verse generally. Much of the beauty of a poem will be lost to the ill-informed in this respect.

MODERN MANNERS.—Perhaps the final accomplishment for a woman is to be truly womanly. It may be necessary to assert this in times when hunting, shooting, cricket, and boating are no longer exclusively masculine pursuits. It is one thing to encourage healthy exercises —it is quite another to adopt the rough and hardening pastimes of men. Whatever is destructive to feminine delicacy, however innocent and even healthy, is open to objection. It is good that a woman should walk well, but it is not equally clear that she should scale Mont Blanc. A woman may ride, but surely not sanction by her presence the questionable practice of foxhunting. A girl may be encouraged to speak frankly, but she cannot quite afford to dispense with reservations, nor need she imitate the abrupt and slangy style of her schoolboy brothers. Dancing may be recommended as highly conducive to graceful movement, but it should be dancing and not the ungraceful and violent jumping movement that is frequently exhibited in the modern ball room. Too much ceremony is wearisome, and mocks the kindly nature with its unreality, but surely no ceremony whatever is an unbecoming substitute. Modern fashions in dress are not necessarily always becoming, or even free from gross violations of good taste. Fashions sometimes prevail which are at one and the same time costly, ugly, and injurious to health. Ostentatious and extravagant modes of life are only evidences of the vulgarity that mere wealth often creates, for nothing is more truly unrefined than that kind of challenge to others to match the bigness of our house, the number of our dinner parties, the splendour of our equipages, and so on. Social life being what woman makes it, we must look to woman to counteract by her influence the evil effects of modern wealth; but to lead the refinement of the world, she should be a competent judge of her most effective sphere of action. In this position woman reigns and reigns worthily, when her title to sovereignty is based on a happy union of womanliness with culture.

THE END.

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